Collective learning in strategic Public Private Partnership (PPP) procurement systems for social infrastructure

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DECLARATION

I, Daniel Marinus Maria Vermeer, confirm that the work presented in this thesis is my own. Where information has been derived from other sources, I confirm that this has been indicated in the thesis.

London, 10 June 2019

ABSTRACT

This thesis explores how organisations involved in temporary joint ventures established for strategic Public Private Partnership (PPP) procurement systems arrange themselves and learn collectively so as to deliver a portfolio of social infrastructure, in terms of meeting or exceeding agreed performance criteria for whole-life value for money and environmental sustainability. This PhD research fulfils a gap in theory about the systematic way in which organisations involved in strategic partnerships can learn collectively and how this affects their performance. Theories and tools that underpin organisational learning and collective learning affiliated to temporary organisations are considered. The research also examines insights into the principles of value for money and partnering in construction, risks and benefits in complex procurement, project-based environments, total quality management, systems thinking and performance improvement inherent to strategic PPP procurement systems.

The novel and unique contribution to theory made by this thesis is the exploration of how the parties to this complex form of PPP learn collectively. How learning can reveal itself in permanent construction organisations has been well researched by scholars, as has how learning can take place in temporary organisations that are often seen in the construction sector. However, what is lacking is a common understanding of how this learning occurs in a complex hybrid form of organisation, one where multiple permanent public and private sector organisations are working together strategically to form new long-term temporary organisations on a repeating basis. This research tries to understand how learning can take place in this specific hybrid organisational structure. It is a relatively rare and complex organisation type that can be proposed by governments to attempt to procure projects in a more systematic way instead of piecemeal, and taking a whole-life value approach to projects.

The critical evaluation takes the case of Building Schools for the Future (BSF) in England, a highly ambitious capital programme that commenced in 2003, and was summarily cancelled in July 2010. Its aim was to transform all English secondary (and later also primary) schools into shining examples of 21st-century education provision, setting new norms for the schools estate. The work comprises a critical evaluation of strategic PPP procurement systems for the delivery of social infrastructure under BSF, called Local Education Partnerships (LEPs).

The exploratory research is based on a mixed method comprising both quantitative and qualitative elements to identify, by taking a phenomenological approach, what the key objects studied (key LEP participants and LEP-built schools) share in common. Of the 44 LEPs that were established, 12 have been investigated as a form of strategic PPP procurement in England, as well as 600 schools worth approximately £9bn delivered by all LEPs between 2006 and 2015 as part of the legacy BSF programme. Any LEPs that had reached financial close prior to the programme termination date were analysed, especially those that had reached high levels of maturity. Performance parameters of schools procured through LEPs

for value for money and environmental sustainability are identified and analysed across the procurement stages: design, build, maintain and operate. Further data is obtained from a major survey of 72 participants involved in 12 operational LEPs, along with information about their contractual and financial PPP and Private Finance Initiative (PFI) development and delivery structures.

The theoretical base is drawn from management science domains of organisational learning. Based on the analysis and findings, learning collectively in PPPs appears to be a crucial factor for improvement in getting better whole-life value for money and environmentally sustainable assets. For that reason, a learning framework called the Asset Value Enhancement Model (AVEM) is introduced and discussed using elements of systems thinking, continuous improvement and total quality management. It embeds collective learning over time from organisations involved in a long-term strategic partnership, as the underlying assets travel through their lifecycle. The circular nature of the model (double-loop learning and Plan-Do-Check-Act) calls for a joint commitment, shared culture and aligned communication to cultivate ongoing value to the public and steady returns to the private sector, beyond merely project-specific improvement. After applying the AVEM in the context of LEPs, the research study concludes that the collective learning from eight contract performance mechanisms is diverse. The achievement of these performance requirements can be a good basis upon which to measure the success of the public private partnership in BSF. The results steer a wider discussion on interpolated theories of organisational learning, and especially how to achieve collective learning in strategic PPP procurement systems for social infrastructure.

The research does not intend to promote nor criticise the legacy policy of BSF. Neither does it intend to make a political statement regarding the current and/or previous government. It does critically monitor, analyse and evaluate the complex procurement method using LEP companies that underpin the legacy BSF policy, and appraise the assets they have created. In particular, it looks at how learning collectively emerges between projects within a LEP (project-based) and the organisations involved in and between LEPs (inter-organisational). The procurement method is similar to that for the Local Improvement Finance Trust (LIFT) companies in healthcare and the hub companies for social infrastructure in Scotland, and not too dissimilar to other forms of bundled PFIs in the UK and worldwide. Beyond its academic value, this research might encourage understanding of and collective learning in a long-term strategic PPP when thinking about future innovations in procurement policy, both in the UK and abroad. The results may also inform the future policy and practice of strategic PPP procurement systems about how to deliver and manage infrastructure portfolios better, based on hard metric asset-level data.

Key words: collective learning, environmental sustainability, organisational learning, PPP/PFI procurement, strategic partnership, systems thinking, temporary organisation, value for money

IMPACT STATEMENT

One main research outcome is the presentation of a conceptual learning framework called the Asset Value Enhancement Model (AVEM). It will be useful for scholars and policy makers to explain and debate at what points the collective learning achieved in complex strategic PPP procurement systems creates opportunities for changes (incremental or radical), and under what circumstances any observed lack of collective learning becomes disruptive. The AVEM allows decision makers and management to improve their capabilities in thinking how to learn as a collective partnership from project-to-project (intra) and inter-organisational between multiple partnerships that these organisations (comprising public authorities, private sector contractors and investors) might have an interest in, so that good practice knowledge is retained for the future, shared systematically between parties concerned and to prevent similar mistakes to reoccur. One process benefit derived from the application of the AVEM is that it encourages the most critical learning to be captured and passed on by identifying specific opportunities for key participants involved in strategic PPP procurement systems to learn, especially collective learning points and any considerations for learning over time.

Another benefit inside academia is the adaptation of Quality Function Deployment (QFD) as an evaluation tool for processing qualitative data during the design, delivery and operation of assets. Recurrent and longitudinal use of the 'Asset Value QFD' helped to observe to what extent collective observations and learning points change due to the long-term nature of PPPs.

Outside academia, the insights gained from the data and its analysis through the case of BSF LEPs and their application, could support policy makers to develop new legislation for complex procurement systems, to think about ways to more effectively articulate the value of integrated business models, and in doing so incentivise practitioners to adopt a more systematic approach to procuring complex performance and collective learning over time.

This research is supportive of what is often referred to as 'evidence-based policy', where value for money and environmental sustainability are posited to be only achievable when thinking, measuring, assessing, acting on and learning about social infrastructure as whole-life assets (both the operational and the environmental). Insights from this research on LEPs could also be relevant to other sectors with a similar research programme. For example, England's healthcare sector where a similar type of model is applied for primary care facilities (LIFT), in Scotland where the government has adopted a similar model (hub) for social infrastructure, or the Mutual Investment Model for schools in Wales. It might also be relevant in the EU, where the European Fund for Strategic Investments supports pooled or portfolio PPP procurement. Globally, similar research might assist policymakers in those countries considering the use of strategic PPP procurement systems.

A summary of this thesis will be disseminated to members of the Major Projects Association (MPA) and options are being considered to turn this research into a book publication.

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Over 100 industry experts were consulted and I appreciated their enthusiasm and commitment to participate. While securing face-to-face interviews with the right people in different parts of England occasionally proved challenging, I received much positive support and would like to thank the many people who provided knowledge, data and encouragement during the project.

This research study was a unique opportunity to analyse the learning from LEPs. With support from the Department for Education's Education Funding Agency, UCL, MPA and industry, there has been a wealth of access to people and information, just before the Local Education Partnerships (LEPs) completed most of their pipeline of projects. Access to these organisations was strengthened by the fact that with the demise of the Building Schools for the Future programme, intellectual knowledge was slowly diminishing.

The research study also proved to attract interest from multiple science domains that are taught and researched at the Bartlett UCL: Strategic Management of Projects, Infrastructure Investment & Finance, and Building Performance Analysis. I would like to thank all the staff members and researchers who have greatly inspired me over the years.

Finally, I would also like to thank the NHS Community Health Partnerships for allowing me to share the theoretical framework and the collective learning legacy from LEPs to help shape their future policy making.

Daniel Marinus Maria (Daan) Vermeer

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LIST OF ABBREVIATIONS AND ACRONYMS

4ps	Public Private Partnerships Programme
AVEM	Asset Value Enhancement Model
BB98	Building Bulletin 98
BCIS	British Cost Information Service of RICS
BMS	Building Management System
BRE	Building Research Establishment
BREEAM	BRE Environmental Assessment Method
BSF	Building Schools for the Future
BSFI	BSF Investments LLP
BSRIA	Building Services Research and Information Association
Capex	Capital expenditure
CFR	Consistent Financial Reporting
CHP	Community Health Partnerships
CIBSE	Chartered Institution of Building Services Engineers
CIC	Construction Industry Council
CIT	Continuous Improvement Target
CPT	Collective Partnership Target
D&B	Design and Build
DB Co	Design and Build contractor
DBMO	Design, Build, Maintain and Operate
DCSF	Department for Children, Schools and Families
DEC	Display Energy Certificate
DECC	Department of Energy & Climate Change
DfE	Department for Education
DfES	Department for Education and Skills
DfMA	Design for Manufacture and Assembly
DoH	Department of Health
DQI	Design Quality Indicator
EFA	Education Funding Agency
EFSI	European Fund for Strategic Investments
EI	Equity Investor (or Private Sector Partner)
EPBD	Energy Performance of Buildings Directive
EPC	Energy Performance Certificate
ESC	Education Select Committee
ESCo	Energy Services Company
FAME	Financial Management Made Easy – accounts database of UK companies
FBC	Final Business Case
FC	Financial Close

FF&E	Fittings, Furniture & Equipment
FM	Facilities Manager
FM Co	Facilities Management provider
GIFA	Gross Internal Floor Area
GM	LEP/SPV General Manager
HM Treasury	Her Majesty's Treasury
hPA	hub Partnering Agreement
IC	Independent Certifier
ICAS	Institute of Chartered Accountants of Scotland
ICE	Institute of Civil Engineers
ICT	Information and Communication Technology
IPA	Infrastructure and Projects Authority
IPCC	Intergovernmental Panel on Climate Change
IPD	International Property Databank (now MSCI)
ITCD	Invitation To Continue Dialogue
ITPD	Invitation To Participate in Dialogue
ITSFB	Invitation To Submit Final Bid
KPI	Key Performance Indicator
LA	Local Authority
LEP	Local Education Partnership
LIFT	Local Improvement Finance Trust
M&E	Mechanical and Electrical services
M&O	Maintain & Operate
MCA	Multi-Criteria Analysis
MHF	Main Heating Fuel
MPA	Major Projects Association
NAO	National Audit Office
NHS	National Health Service
NPAP	New Projects Approval Process
NPD	New Project Development
NPV	Net Present Value
OBC	Outline Business Case
OECD	Organisation for Economic Co-operation and Development
OGC	Office of Government Commerce
OH&P	Overheads and Profits
OJEU	Official Journal of the European Union
Opex	Operational expenditure
PA	Project Agreement
PAC	Public Accounts Committee
PBO	Project-Based Organisation

PCP	Primary Capital Programme
PDCA cycle	Plan-Do-Check-Act
PF2	Private Finance 2 (UK's successor of PFI)
PFI	Private Finance Initiative
PfS	Partnerships for Schools
PMS	Performance Measurement System
POE	Post-Occupancy Evaluation
PPP	Public Private Partnership
PQQ	Pre-Qualification Questionnaire
PRU	Pupil Referral Unit
PSBP	Priority Schools Building Programme
PSC	Public Sector Comparator
PSP	Private Sector Partner (or Equity Investor)
QFD	Quality Function Deployment
QS	Quantity Surveyor
RICS	Royal Institute of Chartered Surveyors
ROI	Return on Investment
RPI	Retail Price Index
SA	Services Agreement
SBC	Strategic Business Case
SCM	Supply Chain Management
SCPM	Strategic Competitive Positioning Model
SfC	Strategy for Change
SFR	Statistical First Release (experimental statistics)
SFT	Scottish Futures Trust
SEN	Special Educational Needs
SET Plan	Strategic Energy Technology Plan
SHA	Shareholders Agreement
SMART	Specific, Measurable, Achievable, Relevant, Time bound
SoPC	Standardisation of PFI Contracts
SPA	Strategic Partnering Agreement
SPB	Strategic Partnering Board
SPSS	Statistical Package for Social Sciences
SPV	Special Purpose Vehicle
TA	Lender's Technical Advisor
TO	Temporary Organisation
TQM	Total Quality Management
TUFA	Total Usable Floor Area
VfM	Value for Money
WLC	Whole-Life Cost

"Complexity can easily undermine confidence and responsibility – as in the frequent refrain, 'It's all too complex for me', or 'There's nothing I can do. It's the system'. Systems thinking is the antidote to this sense of helplessness that many of us feel as we enter the 'age of interdependence'." (Senge, 2006, p. 69)

Chapter 1 – Introduction

This PhD research study sets out to explore collective learning in temporary strategic Public Private Partnership (PPP) project organisations established for the delivery of social infrastructure assets. The aim of this chapter is to introduce the research domain and problem area, added value, the research objectives and main outcomes of this study. The research is set in the UK, specifically England.

A major investment programme for the procurement of social infrastructure in England called Building Schools for the Future (BSF) was launched in 2003 by the then Labour government. The government's preferred policy delivery model for BSF projects was the Local Education Partnership (LEP), which was a strategic PPP with a significant proportion of Private Finance Initiative (PFI). The introduction of PFI into the BSF procurement policy was fundamentally driven by the desire to enhance project performance including lowering project costs, shortening construction times, and increasing overall quality in the end product and services. The cancellation of BSF in May 2010 nullified the opportunities for gaining advantage from LEP being set up, but the question is whether those that were established have the potential to be more efficient and effective in the long run.

The requirement or even the need for LEPs to learn was ill-defined and likely not foreseen as an important issue in the national BSF policy documentation. There is only one reference to learning in the standard policy, about the monitoring of costs on projects by the LEP:

> *"The LEP shall provide (as appropriate) and keep a written record of all monitoring of costs carried out under this Agreement … to the LA (and/or PfS [Partnerships for Schools] under the Shareholders Agreement) to enable it to record and assimilate the performance of the LEP and its Project Companies and to record and disseminate any lessons to be learned relevant to the BSF Programme or any successor initiative"* (PfS, 2008c, SPA Clause 8.5(c)).

This implies that learning was only taking place at a national programme level, but it was not embraced at LEP level. In April 2009, the then CEO of delivery agency PfS (now the Education Funding Agency (EFA)) said:

> *"We continue to learn, and apply, the lessons from the earlier waves of BSF LEPs, something which the NAO [National Audit Office] and other reports over the past year have noted is making a real impact on the timeliness, efficiency, standards and cost-effectiveness of this once-in-a-lifetime programme"* (PfS website, accessed April 2009).

Hence, it is of need and value to explore how collective learning can take place effectively for those organisations involved in possible future PPP procurement policies from BSF LEPs.

While examples of learning from major economic infrastructure programmes exist, both in the UK and abroad, this has been the case to a lesser extent for major capital investments in social

infrastructure. A full suite of learning legacy material from the BSF programme and the LEP model was published online in 2009.[1] Examples of successful learning legacy initiatives in the UK for economic infrastructure include London Olympics 2012,[2] Crossrail[3] and Heathrow T5.

The BSF programme was cancelled in July 2010, by the then newly elected Conservatives/Liberal Democrat coalition government. The Review of Education Capital commissioned by the Department for Education (DfE) that followed in April 2011 examined how education capital was spent by the previous Labour government, looking specifically at the allocation and distribution of capital funds, the design and build process, at removing burdens, and maximising Value for Money (VfM) (DfE website, visited March 2013). The report was critical, stating that the BSF procurement "*system is complex, time-consuming, expensive and opaque. The aims of capital expenditure in education should be to build good, fit-for-purpose facilities, and to look after them over their lifetime"* (James, 2011, p. 10). The DfE Review of Education Capital also reported that despite the rising spend on energy by schools across the estate, not much had been done to reduce either usage or energy management in a coordinated way. Furthermore, the report states: *"there is no evidence of an effective way of learning from mistakes (or successes)*" (James, 2011, p. 5). Other areas of criticism in the DfE Review of Education Capital are: the high bidding costs, with too much money wasted on consultants; high-quality designs are not achieved; there is too much variation in building costs; the programme is too large and too complex; there is a lack of client expertise; sustainability opportunities are missed; no good-quality data is collected on the condition of the estate; and the BSF vision and objectives were too ambitious.

This research addresses some of the concerns in the DfE Review of Education Capital, the preceding Education and Skills Committee, National Audit Office, Public Accounts Committee and PricewaterhouseCoopers reviews (House of Commons, 2007; NAO, 2009; Public Accounts Committee, 2009; PwC, 2010) and the subsequent ICAS and ESC Reviews (Shaoul et al., 2013; Education Select Committee, 18 March 2015)). A lack of confidence was expressed by the then new coalition government concerning the extent public sector clients obtained satisfactory whole-life VfM and environmental sustainability performance from their newly built schools (HM Treasury, 2011c; James, 2011). These concepts of performance will be discussed further in sections 1.2.2 and 1.2.3 below and will become a central theme in this thesis. Some of these critical reviews by ICAS, ESC, NAO, PwC and DfE are later expanded upon in section 2.5.2.2 and **Appendix C3**.

The DfE's EFA, responsible for delivery of education capital in England, is supportive of this research. The EFA Divisional Director of Programme Delivery wrote a letter, dated 26 February 2013: *"his [Vermeer's] review of the [BSF] programme should be useful in informing*

[1] Local Education Partnerships Toolkit: www.partnershipsforschools.org.uk/library/BSF-archive/LEP-toolkit/BSF-LEP-toolkit.html (visited: Mar-2014)
[2] London 2012 Olympics learning legacy website: http://learninglegacy.independent.gov.uk/ (visited: Jan-2016)
[3] Crossrail learning legacy website: http://learninglegacy.crossrail.co.uk/ (visited: Feb-2016)

its successors, by identifying elements of the original model that could be revised to provide better Value for Money solutions going forward, additional to the lessons already learnt and implemented". A copy of the letter is in **Appendix B1**.

A number of successors of large-scale strategic PPPs for social infrastructure investment have emerged in the UK beyond BSF LEPs, including Local Improvement Finance Trust (LIFT and Express LIFT) by the NHS and the Scottish hub model. These examples prove that strategic partnerships continue to be attractive as hybrid organisations to procure and deliver products and services. In fact, the use of strategic partnerships (also referred to as strategic alliances) have been very popular since the 1980s. Morrison and Mezentseff (1997, p. 351) cite Levinson and Asahi (1995, p. 50), who comment that *"these partnering approaches match and respond to the uncertainties and complexities of today's globalised business environment"*.

Since the early 2000s, UK governments have promoted forms of large-scale strategic PPPs as a mechanism to procure, develop and deliver forms of capital assets that provide public services. Examples include the non-profit distributing model, the Local Asset-Backed Vehicle, LIFT and LEP models in England, the Mutual Investment Model in Wales, the Scottish 'hub' model, and the PFI/PF2 procurement model. Key features of all these alternative models include their partnership-based approach, regulation of equity returns, attention to better transparency, flexibility and risk allocation, attractiveness to institutional investors and speed of procurement (HM Treasury, 2012). These contracts typically include an element of private finance. A long-term integrated contract model is used that encompasses the full asset lifecycle. Private partners are contracted to deliver a range of agreed works and services during a 25 to 35 year partnership. Internationally, there is increased attention to strategic PPP procurement of public services. Private finance of social infrastructure plays a significant role in Europe, in some places more than in others. In 2009, the European social infrastructure market was calculated to be around €420bn (Inderst, 2009).

The asset value and organisation performance requirements are interdependent, in order to connect the value of the asset for the public client with the business benefits that accrue from the creation of new value (Spencer and Winch, 2002). So, in the case of strategic partnership procurement and long-term capital PPP programmes, the *organisations* are the key contract participants involved in the temporary project organisations, and the *assets* are the different forms of social infrastructure they can deliver. Asset performance requirements can be articulated in VfM and environmental sustainability criteria. This will be further explained in sections 1.2.2 and 1.2.3. This leaves a potential gap with regards to the organisation performance requirements and leads to the following wider problem area:

There is an observed lack of clarity on how the quality of temporary strategic partnership procurement systems affects long-term VfM and environmental sustainability performance of social infrastructure (OJEU Regulations, 2015; UN FCCC, 2015; IPCC, 2014; UK Parliament, 2008).

In the context of school infrastructure and strategic partnerships with LEPs in England, public partners had to formulate functional asset-level output and service requirements, for example: meeting cost benchmarks; delivering sustainability and climate goals; delivering high-quality designs; introducing training; increasing the use of Information and Communication Technology (ICT) for learning; tackling public violence; community inclusion; and even targeting performance of pupils (NAO, 2009; PwC, 2010).

The LEP model was inherited from LIFT and adapted under BSF policy as a standard PPP delivery mechanism identified in the Local Authority (LA) strategic plans. The original purpose of a LEP was to create local business conditions for long-term partnering services for the LA client to realise the aims of BSF (Lord, 2005). Because a BSF project involved a long-term programme that might include a complex mix of funding routes, services and contracts, the initial procurement was designed to select a Private Sector Partner (PSP) with a range of skills and expertise, and to establish a long-term partnership for developing and delivering a pipeline of capital projects as prescribed at a local level in the authority's strategic plan (PfS, 2005b).

When Financial Close (FC) has been reached and a LEP becomes operational, it enters into a long-term Strategic Partnering Agreement (SPA) with the concerned LA. A LEP gets the sole and exclusive right to provide all the works and services to the initial capital projects for which it had originally tendered via the Official Journal of the European Union (OJEU), and any subsequent approved new projects identified in the authority's strategic plan. The SPA formally sets conditions for granting exclusivity to the partners in the LEP and the requirements for the LEP to perform (PfS, 2008c). As a consequence, in case of underperformance, the LEP may lose its exclusivity. This may lead to a reduction in the volume of pipeline projects for the PSP and its supply chain during the lifetime of the LEP. Further detail about BSF and the economics of the LEP is summarised and debated at **Appendix C**.

After the cancellation of BSF, the DfE published the Review of Education Capital, which was very critical about the BSF policy (James, 2011). The issues raised in this review, plus a number of other critical reports by other organisations (section 2.5.2.2 and **Appendix C3**), helped to shape the contextualised problem area for this research study.

In the context of social infrastructure and legacy BSF projects with LEPs in exclusivity, recent UK governments have observed a lack of confidence in the extent public clients obtain long-term VfM and sustainability performance from their built assets (HM Treasury, 2011c; House of Commons, 2015; James, 2011; NAO, 2009; Public Accounts Committee, 2009; PwC, 2010).

New school buildings are often complex bespoke systems that are difficult to control, with little feedback available on their real operation and actual performance. Evidence to date suggests that the gap between 'as designed' and 'in use' performance of schools can be very large (Mumovic and Santamouris, 2009). This can have considerable implications on what is set out

in legislation and policy documentation. In particular with a contractual commitment to meeting performance goals it will become more important to close the gap. Moreover, if the occupants of school buildings are not using it in a sustainable way, then the benefits may not be apparent. Mumovic and Santamouris (2009) express a need to engage with occupants (end users), owners (clients), contractors and facility managers in operating their buildings in a radically more sustainable and responsible way.

1.1 Added value to the research domain

How learning can appear in permanent construction organisations has been well researched by scholars (Argyris and Schön, 1978; Bell et al., 2002; Dodgson, 1993; Field and Ford, 1995; Kupers, 2012; Levitt and March, 1988; Loch and Morris, 2002; Wang and Ahmed, 2002). How learning can take place in temporary organisations that are often seen in the construction sector has also been widely explored (Barlow and Jashapara, 1998; Chan et al., 2005; Cross and Israelit, 2000; Kululanga et al., 2001; Loch and Morris, 2002; McCann, 2011; Schwab and Miner, 2011; Tennant and Fernie, 2013). However, what is lacking is a common understanding of how this learning happens in a complex hybrid form of organisation (e.g. LEP, LIFT or hub companies), one where multiple permanent public and private sector organisations work together strategically to form new long-term temporary organisations on a repeating basis. This organisational and procurement phenomenon has occurred at scale in the UK where strategic PPPs are created to develop, deliver and operate long-term capital projects. This research tries to understand how learning can take place in this specific hybrid organisational structure. It is a relatively rare and complex organisation type that can be proposed by governments to attempt to procure projects in a more systematic way instead of piecemeal. This will be expanded upon in chapter 7, in particular section 7.6.

The organisational learning literature has already reached a degree of agreement that contracts cannot, even in much simpler contractual arrangements, hope to cover all eventualities and circumstances (Dyer and Singh, 1998; Poppo and Zenger, 2002). This research therefore seeks to make a real and timely contribution to the emerging debate on the systematic way in which organisations involved in strategic PPP procurement systems can learn collectively and how this affects their performance.

The notion of collective learning, in the context of organisational learning and the learning organisation, is defined in a large volume of literature (Argyris and Schön, 1996; Cohen and Sproul, 1991; Levitt and March, 1988; Senge, 1990; Nevis et al., 1995; Argyris and Schön, 1978). The concept of collective learning learning within organisational learning literature is a leading aspect in this explorative study, as well as learning in complex temporary project-based environments. In their research on the concept of organisational learning, Wang and Ahmed (2002) identified six focus areas and associated practices: learning, process or systems, culture or metaphor, knowledge management, continuous improvement, and

innovation or creativity. Although each of these are evident, they overlap in one perspective or another, but do not fundamentally exclude one from another.

The ability of a project team to learn collectively is essential for improved productivity and performance (Schindler and Eppler, 2003). However, the nature of construction projects may inhibit collective learning due to their temporal nature and structural characteristics (i.e. procurement method and contract type) (Love et al., 2015b). Swart and Harcup (2013) suggest that an understanding of various levels of learning, how it is transferred and interconnected, is required. This is particularly pertinent in strategic PPP procurement systems, where there are often multiple interdependent organisations, often with conflicting goals and objectives.

A number of previous studies investigated how learning can be enabled in the construction industry (Brady and Davies, 2004; Cheng et al., 2004; Franco et al., 2004; Love et al., 2015a; Love et al., 2002; Love et al., 2000b; Kululanga et al., 2001; Bresnen, 2009). Research about the integration of human relationships in capital development projects has identified four studies (Doubra and Elhag, 2010). One of these is an approach called inter-organisational learning developed by Franco et al. (2004) to address the lack of processes for routine inter-organisational review of construction projects to enable learning and add value to projects. The approach provides the benefit of deriving feedback on project outcomes which can be a useful tool for learning to improve performance on subsequent projects.

Previous studies have shown that having long-term partnerships or partnering relationships will also improve the performance of the concerned team (Akintoye et al., 2003a; Bennett and Peace, 2006; Green, 1999a). The two Egan reports encouraged the UK construction industry to focus on long-term relations, supply-side integration and integrated teams to increase value to the customer: *"The [construction] industry must replace competitive tendering with long-term relationships based on clear measurements of performance and sustained improvements in quality and efficiency"* (DETR, 1998, p. 5; Strategic Forum for Construction, 2002, p. 12). This statement, emphasised in both reports, seems to imply a fundamental worry to clients that the project delivery does not meet their expectations because of unsatisfactory long-term relationships with suppliers. Another client's worry concerns how they can be sure to obtain the best possible value from their build assets. Thus, there is a tension between the structure and significance of the contract regarding delivery of requirements and that of the long-term strategic relationship. Both are expected to last until the end of the contract period, but with such large time horizons, aspects of incompleteness and unsuitability arise (Hart, 2003).

Much of the construction-related studies into organisational learning centre on partnering and alliances (Barlow and Jashapara, 1998; Cheng et al., 2004; Holt et al., 2000; Kululanga et al., 2001; Love et al., 2002). Chan et al. (2005) question whether organisational learning should take place at the project level, where partnering should be a prerequisite. Hence, does this imply that companies that do not partner do not engage in organisational learning? The authors recommend the need to emphasise the inter-organisational dynamics involved in both

the processes and outcomes of organisational learning, the consideration of organisational learning beyond partnering, and the shift towards viewing projects as learning networks.

Kululanga et al. (2001) highlight two underlying principles of organisational learning: the generation and/or absorption or diffusion of knowledge that results from going through a learning process induced in both internal and external business environments; and the application of knowledge to sustain continuous improvement in performance. These two principles suggest that organisations should consider how to develop learning capabilities, and ways to measure organisational learning. In addressing this, Kululanga et al. (2001) have developed mechanisms for describing how to support and measure generative learning. However, Cheng et al. (2004) point out that there are very few papers that describe the relationship that exists between strategic partnering and organisational learning. They argue that organisational learning promotes continuous improvement, as Irani and Sharp (1997) discuss.

Continuous improvement is also considered a key attribute of strategic partnering (Cheng and Li, 2002; Construction Industry Board, 1997). There is also a common premise that a learning environment (e.g. learning alliance or learning organisation) is central to the strategic form of network relationship, for example strategic alliance or construction alliance (Holt et al., 2000; Morrison and Mezentseff, 1997). Consequently, when analysing effects of strategic partnership procurement systems, it is imperative to engage the science domain of organisational learning from multiple levels and angles.

It is also apparent that there is a lack of consensus within the UK construction industry about what value constitutes (best value, value for money, best value for money) or how to measure and assess it (Akintoye et al., 2003b; Ball et al., 2003; Brady et al., 2005b). Additionally, in relation to long-term partnerships, there is an indication that it is applied increasingly loosely to describe what is in fact a multifaceted practice (Bresnen and Marshall, 2000b), whether institutionalised by means of partnering, project partnering or strategic partnering. However, achieving value through partnering is not an easy option. Teams undertaking partnering projects face a task of remarkable complexity and difficulty (Bennett and Peace, 2006). Notwithstanding the perceived lack of clarity, Bennett and Peace argue that both terms (value and partnering) are strongly tied in with performance and in particular performance improvement.

Since the early 1990s, the UK government has recognised the option and possible advantage of involving the private sector in the delivery of public services. This introduced the notion of working in ‘partnership’ and this recognised the long-term and significant level of interaction needed to ensure success. For this form of partnership working to be successful, there is the explicit need for effective contracts to be put in place to act as the foundation for what then will happen, but a partnership will only work well if the parties to the partnership accept the need to find optimal ways of working together, both to allow the contract to be enacted and to deal

with the many situations that the contract will be silent on but which need to be addressed. This all implies a clear need for the parties involved to learn. The novel and unique contribution made by this thesis is the exploration on how the parties to this complex form of PPP learn collectively. The notion of a partnership will be expanded upon in chapter 3 (section 3.2) and collective learning will be discussed further in chapter 4 (section 4.4)

This focus on collective learning in strategic PPP procurement systems distinguishes this thesis from previous studies, such as the learning framework for successful cooperative strategic partnerships (Morrison and Mezentseff, 1997), the learning model for construction alliances (Love et al., 2002), the continuous improvement model (Cheng et al., 2004), the revised Total Quality Management (TQM) framework (Oakland, 2014; Oakland and Marosszeky, 2006) and the project capability model (Brady and Davies, 2004). The strategy for this type of procurement system is to develop, deliver and maintain assets to which complex performance can be derived (Roehrich and Lewis, 2014).

In this case, the BSF policy intention was to build schools that demonstrated high levels of both value for money and environmental sustainability. The policy was set up by PfS and rolled out through LEPs as the recommended PPP delivery vehicle. When various organisations from both the public and private sector involved in LEPs work with detailed policy and contract mechanisms, it generates results in terms of output performance of the constructed or refurbished assets (positive or negative) as well as opportunities for learning (specific individual and collective learning points). This introduces the temporal and geographical nature of LEPs as location- and project-based organisations, which may limit any distribution of knowledge that is accumulated in the course of a project. This knowledge could be at risk of being allocated to a different task, another team or a new deadline (Defillippi and Arthur, 1998). Despite the difficulties of project-based learning, several studies show that firms do achieve organisational learning through projects (Prencipe and Tell, 2001) and that performance in integrated projects depends on how quickly and successfully PPP firms can learn and find repeatable solutions (Davies and Brady, 2000). Ruuska and Brady (2011) argue that the effectiveness of the replication strategy in complex investment projects needs to be studied in more detail. As a result of this consideration, a simple and obvious question arises: how can organisational learning take place in strategic PPP procurement systems, and why is it important for the participants involved to learn collectively? This thesis helps to answer this question.

1.2 Added value to policy and practice

This research study may add value to the way in which practitioners involved in operational strategic partnership procurement systems can learn in and from project-based organisations, and at public policy levels to observe how strategic PPP procurement systems might evolve and work better in the future. Detailed insights and lessons from legacy policies involving

strategic partnership procurement systems could add value to the current advancement of practice and future policy development, for example to England's National Health Service (NHS), which applies a similar model called LIFT, to the Scottish Futures Trust, which adopts a model based on similar principles (hub), to the European Fund for Strategic Investments (EFSI), which encourages investment platforms for pooled or portfolio PPP/PFI procurement, and to those countries considering strategic PPP procurement models within their policies for modernising public services.

In addition, the outcomes may be of interest to UK central government departments and organisations, in particular HM Treasury, Infrastructure and Projects Authority, Cabinet Office Procurement Team, National Audit Office, DfE, EFA, Department of Health, Community Health Partnerships (CHP), and Scottish Futures Trust.

Other beneficiaries are the European Commission, foreign national government departments, infrastructure funds, debt providers, building contractors, Facilities Management (FM) services providers, LAs and school headteachers. It might also inspire policymakers and practitioners searching for new approaches, observations and insights that contribute to their work.

1.2.1 The need to analyse the legacy of BSF LEPs

There are approximately 21,500 maintained schools in England: around 18,000 are primary schools and 3,500 are secondary schools. Together they have a total school floor area of 60,000,000m^2 and a replacement value of £93bn at 2003 price levels, excluding the value of land[4] (DTI, 2003; DfES, 2003a, p. 5).

This research study investigated the state-funded secondary and primary schools procured and built under the previous BSF programme. The aim of the BSF programme was to renew or refurbish the secondary schools estate (around 3,500 in total) and primary schools in all England's 150 LAs. The urgency for investment was driven by a structural maintenance and investment backlog, with 80% of all schools over 20 years old, and to provide learning environments not just compatible with the current state of thinking, but with an eye to future needs and developments (Children Schools and Families Committee, 2009). The 44 LEPs established have continued to deliver projects for which funding was agreed prior to the cancellation of BSF, and delivered new build and refurbished schools opening well into 2015. When the established pipeline of projects was completed, over 700 schools had received investment through BSF LEPs (PfS, 2010b). In addition, many LEPs delivered other forms of social infrastructure, such as community leisure centres, healthcare, social housing, libraries, administration offices, councils' corporate ICT, renewable energy and/or local sports facilities.

[4] UK Parliament Commons Debate, publication Column 691W on 11 February 2003: http://www.publications.parliament.uk/pa/cm200203/cmhansrd/vo030211/text/30211w20.htm

Mahony et al. (2011) argue in a reflective analysis that a good proportion of the research into PFI and into LIFT within the NHS is very relevant to BSF and could have usefully informed its operationalisation. Some of the same issues are raised in relation to BSF: why are lessons not being learned from past experience, and why are they not being transferred across sectors? Mahony et al. (2011, p. 345) cite Aldred (2007, p. 139), who found that: *"changes in the public sector are helping to create closed networks that are unresponsive to concerns expressed 'on the ground'"*. They argue that it remains to be seen whether a similar finding regarding communication, accountability and risk management will emerge from research into the organisation, administration and implementation of BSF.

Furthermore, Mahony et al. (2011, p. 347) note that: *"BSF constitutes a complex meld of material and cultural motivations of which internal relationships are difficult to identify. Such discursive variability is by no means unique to this particular programme, but the problem with such fuzziness over purposes and aims is that it becomes difficult to understand what would count as BSF achieving its goals"*. This observation is in line with the House of Commons (2007), and the Public Accounts Committee (2009, p. 5), who quote: *"the Department has not explained what success looks like. The Department should define the full benefits it wants BSF to achieve and develop a set of measurable indicators against which it can monitor the success of the programme and assess options".*

Mahony et al. (2011) also argue that in some ways what the government was trying to achieve would become clearer through detailed analysis of the national and local documents, which pertain to the implementation stage of projects within the BSF programme. The authors recommend further research to analyse in detail the documentation produced by LAs to see whether ambiguities, pointed to by the Public Accounts Committee, are being resolved at the level of specific projects. Such analysis should also explore the extent to which a tension or congruence exists between national and local interpretations of purpose and intention.

Most of the data sources for this research have been gathered for analysis of both the operational LEPs and their contractual and financial development and delivery structures. As such, the BSF programme and its procurement arrangement were chosen for this research to investigate issues related to the delivery of whole-life VfM and environmental sustainability performance criteria. Conclusions and recommendations could also be relevant for other types of partnering procurement initiatives for social infrastructure in a national, European or global context. Subject-related lessons could be learned from previous relevant capital investment programmes by policymakers for new capital investment initiatives. This includes the Scottish hub programme, England's Priority School Building Programme (PSBP), which was introduced by the former Conservative-led coalition government in 2011 as a successor of BSF, a proposed evolution of the LIFT policy called Regional Health Infrastructure Partnerships (RHIC), the proposed Welsh Education Partnership policy, or any foreign policy

utilising forms of strategic partnership procurement, for example the Belgian 'Scholen van Morgen' programme.

There is no doubt that the current economic and political climate will further complicate future development of social infrastructure using PPP. However, the BSF programme was sufficiently advanced for serious research to be both possible and essential. Mahony and Hextall (2012, p. 16) conclude that: *"without a much richer and detailed picture of the different relevant influences that maximise the benefits of BSF, an opportunity will be lost to explore the ingredients of success for schools. In the face of the potential to really learn more about what provides a high quality education [provision] for all children the onus is on the Secretary of State to justify why no further research on BSF is planned. In the absence of this we can only conclude that if the decision to cancel BSF was based not on evidence but on political whim then the failure to conduct research on the remaining 700 BSF schools is more of the same".*

1.2.2 Value for Money considerations in BSF

The SPA between a LEP and a LA recognises that the high-level principles in BSF, which underpin the delivery of the parties' obligations, are difficult to measure in isolation. Clause 2.2 of the SPA cites that: *"successful implementation of the Project Agreements, the Shareholders Agreement and the SPA will depend on the parties' ability effectively to co-ordinate and combine their expertise, manpower and resources in order to deliver an integrated approach to the provision of Education Services in the Area and the Services under this Agreement"* (PfS, 2008c). Due to a mixture of PFI and non-PFI procurement strategies in the SPA, it is essential that best VfM performance is well considered in the context of each of these options. In BSF policy, this was defined as the combination of whole-life costs and quality of service or product. Aldred (2008b) argues that there are important VfM implications that arise from procurement systems which mix profit with welfare, and such concerns will remain at the heart of future research in the public sector social infrastructure, not least within educational provision as significant as BSF. Also, Mahony et al. (2011) point out that much research is needed on the configurations involved and the complexities of engaging supply chains in BSF. Concerns about the long-term viability of some of the subcontractors being able to deliver and sustain their commitments (to long-term contracts) make the clarification of the rules of engagement concerning accountability and risk even more urgent.

1.2.3 Environmental sustainability considerations in BSF

The planning, design, construction, maintenance and operation, including transport to and from schools, is of social, economic and environmental significance (IBLF et al., 2009). The UK government (House of Commons and DfE) have emphasised the importance of school infrastructure as a way to help achieve the objectives of the EU 2020 Sustainable Development Strategy (Chatterjee and Reynolds, 2008; House of Commons, 2007; Johnson, 2010). The UK schools estate contributes 2% to national carbon emissions overall, but represents almost 15% of the public sector carbon emissions (DCSF, 2010). At least 60%

carbon reduction by 2050 requires significant energy demand reduction (Chatterjee and Reynolds, 2008; House of Commons, 2007). Locally, schools in England contribute around 40% to 60% of the carbon emissions from a LA's estate (Prodromou et al., 2009) and as such provide a substantial financial burden on the LA's carbon tax payment.

The DfE Review of Education Capital reported that despite the rising spend on energy by schools across the estate, not much has been done to reduce either usage (kWh) or cost (£/m^2) in a coordinated way. While there are some cases of aggregated energy purchasing, individual schools find it difficult to invest through capital funds to reduce energy use later. In addition, the carbon benefits gained from new builds have been outweighed by increases in energy use elsewhere (James, 2011). The James Review recommends that school-by-school monitoring, clear guidelines, and the roll-out of electricity management systems can reduce these costs. When applied to a large retail estate, these measures reduced consumption (and therefore carbon emissions) by 10% to 15%.

One of the recommendations in HM Treasury's report about making savings in operational PFI contracts was to encourage users to reduce energy consumption (HM Treasury, 2011b). The HM Treasury report (p. 17) states that: *"Energy consumption is influenced by how a building is used on a day to day basis. Authorities should monitor energy consumption and consider ways of encouraging users to reduce energy use. It is widely acknowledged that successful energy management is dependent on a good level of energy awareness throughout the organisation, and this is one of the first key actions which authorities should pursue."*

1.3 Defining the research aim and objectives

Given the above general and contextual problem areas, and the fact that in LEPs the need for organisational learning was not identified, the central research question to examine is:

How can collective learning take place effectively for organisations collaborating in possible future strategic PPP procurement systems from the case of BSF LEPs?

In consideration of the general and contextual problem area described above, two research objectives are posed, which in turn allow a discussion on theories underpinning risks and benefits of complex procurement, inter-supplier competition, temporary organisations, principles of collaboration, and project-based learning:

Research objective 1 – Asset level:
To understand **(A) what** the client's key asset performance criteria are in projects delivered by strategic partnership procurement systems, and to explore **(B) how** these requirements are appraised empirically for these joint ventures to deliver whole-life VfM and environmentally sustainable buildings.

Research objective 2 – Organisation level:
To explore **(C) how** key contract mechanisms are being judged by the participants in strategic partnership procurement systems, and evaluate **(D) what** their collective learning observations are, to be able to meet clients' expectations related to the achievement of whole-life VfM and environmental sustainability criteria agreed on projects.

The above research objectives are operationalised as four sub-questions and revealed in context, through the case of BSF schools and their LEPs. Both objectives have a 'What' element, which suggests the use of a non-experimental fixed strategy (e.g. surveys). They also have a 'How' element, which indicates a flexible design of qualitative and quantitative data. Fulfilment of both research objectives will finally lead to the implementation of a specific conceptual learning framework created by the author that can demonstrate how organisations involved in strategic PPP procurement systems for any portfolio type of public infrastructure can learn collectively as well as individually. The research design and strategy chosen to achieve both objectives are discussed in detail in chapter 5.

1.4 Structure of the thesis

During the preliminary stages of this research, the problem area was defined, along with the key problem area and research objectives as outlined in this chapter. Figure 1-1 below presents an overview of the flow for the rest of this thesis.

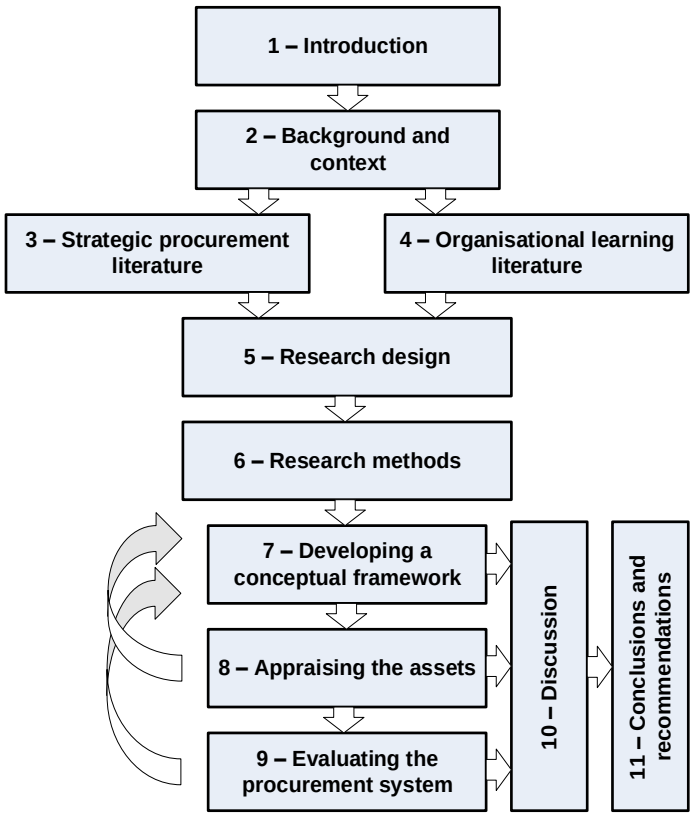


Figure 1-1: Thesis outline

As per the above outline, this thesis has ten further chapters:

Chapter 2: Background and context

This chapter explores the two socio-economic developments that have triggered this empirical research, namely the use of complex PPP procurement systems for social infrastructure, and addressing commitments made for the UK to become a low-carbon economy. Various critical viewpoints are summarised and debated.

Chapter 3: Strategic procurement literature

This chapter reviews the body of knowledge of risks and benefits in complex procurement, inter-supplier competition, projects as temporary organisations, and principles of partnering and VfM.

Chapter 4: Organisational learning and collective learning literature

A holistic overview is presented of the body of theory and techniques in the field of collective learning and its affiliation to organisational learning in construction. The relevant and suitable concepts and models from literature are analysed, related and discussed. The chapter brings to light the notion that organisational learning can manifest itself at multiple levels depending on what archetype the organisation chooses to address root causes of the problems it faces. The author has observed that organisations perform better when they continue to learn collectively over time, adopt elements of systems thinking, and apply feedback loops.

Chapter 5: Research design

The aim of this chapter is to set out how the research design connects to the paradigm and philosophical approach used. This guides the way to the analytical approaches on how data is gathered and analysed, and how conclusions can be drawn from the results. With this in mind, the chapter sets out the high-level strategy adopted for the remainder of the thesis.

Chapter 6: Research methods

This chapter discusses and clarifies the research methods adopted to collect the field data in order to address the identified research questions and objectives. The process of data collection and analysis is described, including the use of Quality Function Deployment (QFD) as an evaluation tool.

Chapter 7: Developing a conceptual learning framework

This chapter builds on the comprehensive literature review in chapters 3 and 4. It seeks to bring together the theoretic concepts of collective learning affiliated to organisational learning in strategic PPP procurement systems. The chapter introduces and discusses the Asset Value Enhancement Model (AVEM), a learning framework adapted from existing models founded on principles of organisational learning, TQM, project-based learning, systems thinking and continuous improvement. The AVEM forms the main contribution to theory. The background and rationale of the AVEM are also discussed in a conference paper shown on page xvii and included in the **CD Appendix**.

Chapter 8: Results from appraising the assets

Drawing from existing theories and by conducting a compounded Multi-Criteria Analysis (MCA) against the original legacy BSF policy and national standards, chapter 8 presents how asset performance can be delivered across various procurement stages. Ten years of quantitative and qualitative data is called upon from multiple datasets comprising 600 operational schools procured and delivered through 44 LEPs, to match a defined set of asset value criteria for VfM and environmental sustainability across the stages: design, build, maintain, operate. This chapter also empirically demonstrates how different procurement options within a LEP joint venture organise themselves to deliver each set of criteria (or both sets combined) across the whole asset life. The results from the asset-level appraisals are reported in three conference papers shown on page xvii and included in the **CD Appendix**.

Chapter 9: Results from evaluating the procurement system

Based on the legacy policies of BSF and by adopting the AVEM that is introduced in chapter 7 as a theoretical framework, it is possible to draw a link between contract requirements of strategic PPP procurement systems and whole-life asset value criteria of the outputs produced by these. Taking the case of LEPs, key contract mechanisms can be identified and apportioned to each quadrant in the AVEM. By using the Asset Value QFD as an evaluation tool, it is possible to identify participants in LEPs that achieve better- versus worse-performing assets, and divide them into four categories: VfM efficiency, cost-effectiveness, environmental sustainability and strength of relationships. Results from the evaluation identify specific opportunities to learn from key participants involved in LEPs, any collective learning points by those participants, and considerations from those that continue to learn over time.

Chapter 10: Discussion

This chapter examines the significance and applicability of the AVEM proposed in chapter 7. The findings from the appraisal of whole-life asset value criteria of LEP-built schools established in chapter 8 are also discussed. The chapter also debates the collective learning points and observations from chapter 9 by key participants involved in strategic partnership procurement systems, using the AVEM as a theoretical framework for collective learning and QFD as a tool to evaluate the main collective learning points.

Chapter 11: Conclusions and recommendations

In this chapter the author provides a summary of the research study, presenting the main conclusions and recommendations. Suggestions for future research are also proposed.

Chapter 2 – Background and context

2.1 Overview

This chapter explores two socio-economic developments in UK public policy that have triggered this empirical research. Firstly, the wide and critical debate by the UK's former 1997-2010 Labour Party government, the 2010 coalition government and the 2015 Conservative Party government about addressing commitments made in the Climate Change Act 2008 for the UK to become a low-carbon economy; and secondly the use of strategic PPP models for procuring elements that comprise social infrastructure, especially education capital. The fact that climate change affects the built environment cannot be ignored. A significant volume of UK built environment projects comprises social infrastructure and within that, education provision. The specific UK policies for climate change and for procuring elements of social infrastructure will influence many generations. Effectiveness of existing policies needs to be considered and empirically evaluated to learn for future policy making.

Section 2.2 below reviews climate change in a global, European and UK context, and in the specific context of education provision in England. Education provision is a form of social infrastructure that will be discussed. Section 2.3.1 sets out the broad definition of infrastructure, the various forms in which it appears. Section 2.3.2 introduces PPP as a procurement option for infrastructure among many others, followed by section 2.3.3 in which strategic partnership procurement is discussed as a highly complex form of PPP, and the role of the private sector. Section 2.4 then introduces three policies where strategic partnership procurement was applied at scale for social infrastructure capital in the UK. The various critical viewpoints are analysed and debated. Section 2.4.4 gives insights into ancillary approaches in the UK and abroad, and the last section, 2.5, delves into the specific research context of education provision in England. It explores all the major policies that encompassed the BSF programme, including the various political viewpoints and wider criticism.

2.2 Background of climate change

2.2.1 Global policy context

The UN Conference of the Parties (COP21) resolution of Paris in November 2015 strongly urged nations to agree on a concrete roadmap to achieve the goal of jointly providing USD 100bn annually by 2020 for climate change mitigation and adaptation while significantly increasing adaptation finance from current levels and to further provide appropriate technology and capacity-building support (UN FCCC, 2015). The UN Intergovernmental Panel on Climate Change (IPCC) published its fifth synthesis report in 2014. The Summary for Policy Makers (SPM) includes a table of recommendations. Many of these can help address climate change, but no single option is sufficient by itself. Effective implementation depends on policies and

cooperation at all scales and can be enhanced through integrated responses that link adaptation and mitigation with other societal objectives (IPCC, 2014).

> SPM 4.1 states: *"Adaptation and mitigation responses are underpinned by common enabling factors. These include effective institutions and governance, innovation and investments in environmentally sound technologies and infrastructure, sustainable livelihoods and behavioural and lifestyle choices."*

Examples of institutional approaches to adaptation and mitigation involving multiple actors include economic options (such as PPPs), laws and regulations, and national and government policies and programmes (such as economic diversification). In urban areas, climate change is projected to increase risks for people, assets, economies and ecosystems. These risks are amplified for those lacking crucial public infrastructure and services or living in exposed areas.

> SPM 4.4 states: *"Effective adaptation and mitigation responses will depend on policies and measures across multiple scales: international, regional, national and sub-national. Policies across all scales supporting technology development, diffusion and transfer, as well as finance for responses to climate change, can complement and enhance the effectiveness of policies that directly promote adaptation and mitigation."*

Existing and emerging economic instruments can foster adaptation by providing incentives for anticipating and reducing impacts. Measures include private finance (PPP), loans, payments for environmental services, improved resource pricing, charges and subsidies, norms and regulations and risk-sharing and transfer mechanisms. Risk transfer mechanisms in the public and private sector can contribute to increasing resilience, but without attention to major design challenges, they can also provide disincentives, cause market failure and decrease equity. Governments often play key roles as regulators, providers or insurers of last resort (IPCC, 2014). These comments reinforce a need to analyse thoroughly how policy models (including PPP and PFI for public infrastructure and services) effectively address the approaches to climate change adaptation and mitigation. Do PFI risk transfer mechanisms deliver better results than conventional public finance, and how should the models evolve? This research study appraises the environmental performance of PFI versus non-PFI infrastructure assets.

Besides, the UN IPCC already established in its fourth assessment report (IPCC, 2007) that human-induced global warming is affecting the climate and chemistry of the Earth and threatening its ecosystems and survival of the human species. Research by the Foundation on Economic Trends explored underlying features and operating principles of infrastructure on the economy to comprehend how the human species can arrive at a sustainable post-carbon era by the middle of the 21st century and avert catastrophic climate change. The work observed that big historic economic transformations occurred when new communication technology converges with new energy systems. To do so, the conventional top-down leadership approach of fossil fuel-based industries could give way to more distributed, lateral and collaborative relationships in an emerging green industrial era (Rifkin, 2011). This

research study analyses effects of collaborative relationships in the context of PPPs to deliver elements of low-carbon social infrastructure.

2.2.2 European and UK policy context

The Energy Performance of Buildings Directive[5] (EPBD) has a principal objective to promote the improvement of the energy performance of buildings within the EU through cost-effective measures. There are four main aspects to the EPBD for EU member states:

1) Establish and implement a methodology for calculating energy performance of buildings, taking account of all factors that influence energy use.
2) There must be regulations that set minimum energy performance requirements for new buildings and large existing buildings when they are refurbished.
3) All properties (homes, commercial and public buildings) must have Energy Performance Certificates (EPC) when sold, built or rented; public buildings over 500m² must also have a Display Energy Certificate (DEC). Since July 2015, the directives require a DEC for public buildings over 250m^2.
4) Boilers and air-conditioning systems over 12kW must be regularly inspected by an energy assessor.

In 2006, a Green Paper was published by the European Commission setting out an energy strategy for Europe around six key areas: competitiveness and the internal energy market, diversification of the energy mix, solidarity, sustainable development, innovation and technology and external policy (Commission of the European Communities, 2006). Five years later, the European Community's Strategic Energy Technology (SET) Plan was published to highlight the critical challenges for the EU's transition to a low-carbon economy by 2020 and in the longer term, aiming for an 80% cut in greenhouse gasses by 2050 compared to 1990 baseline. The SET Plan provides roadmaps for a range of European industrial initiatives: wind energy, solar energy, bioenergy, carbon capture and storage, electricity grid, sustainable nuclear energy and so-called Smart Cities (European Commission, 2015). The energy data analysed in this study covers the period that EPBD is effective, including its targets and policies.

Global and EU information, targets and policies are not the only factors that determine good climate legislation. Advanced UK climate laws such as the 2008 Climate Change Act also pay close attention to institutional arrangements and responsibilities (Nachmany et al., 2015). The Act makes it the duty of the Secretary of State to ensure that the net UK carbon account for all six Kyoto greenhouse gasses for 2050 is at least 80% lower than the 1990 baseline. The Act aims to enable the UK to become a low-carbon economy and gives ministers powers to introduce the measures necessary to achieve a range of greenhouse gas reduction targets. An independent Committee on Climate Change has been created under the Act to provide advice to government on these targets and related policies (UK Parliament, 2008). The Act is the world's first long-term legally binding framework to tackle the dangers of climate change. A number of related UK policies, tools and legislation put into effect for the construction

[5] England and Wales conform to European Directives 2002/91/EC and 2010/31/EU of the European Parliament and of the Council on the energy performance of buildings. The original EPBD was implemented in the UK in 2008.

industry to address in buildings are discussed below. Most of them can be derived from the EPBD and UK Climate Change Act 2008 while others trace back to the late 1990s.

Energy Performance Certificates and Display Energy Certificates

Buildings in the UK need to meet the standards required by the EU's EPBD,[6] as discussed above. EPCs are produced by accredited energy assessors using standard methods and assumptions about energy usage. This means that the energy efficiency of one building can easily be compared with another building of the same type. This allows prospective buyers, tenants, owners, occupiers and purchasers to see information on historic energy efficiency and carbon emissions from their building so they can consider energy efficiency and fuel costs as part of their investment. An EPC includes a recommendation report that lists measures to improve the building's energy rating. Buildings must also display a DEC if they have a Total Usable Floor Area (TUFA) of over 500m², or if they are occupied or part occupied by public authorities. Private organisations occupying a building do not need to display a DEC. DECs for buildings larger than 1,000m² must be renewed every 12 months, and those between 500m² and 1,000m² must be renewed every 10 years. Since July 2015, DECs have been required for public buildings over 250m²; however, this falls outside the period of this research.

The point of the CIBSE TM46 classification on DECs, the benchmark categories A to G, is that they are an activity-based grouping of the stock in types of built property (e.g. multi-building sites, buildings, part building premises) that can reasonably be expected to have similar requirements for use, environmental conditioning or installed appliance loads. So if a category has a larger benchmark, there should be a good reason for it (Bruhns et al., 2011; Bruhns and Cohen, 2011). The operational DEC rating is based on the amount of energy consumed during the occupation of the building over a period of 12 months from meter readings and is compared to a hypothetical building with performance equal to one typical of its type (the benchmark). Typical performance for that type would have an operational rating of 100. A building that resulted in zero CO_2 emissions would have an operational rating of zero, and one that resulted in twice the typical CO_2 emissions would have an operational rating of 200 (DCLG, 2015).

Part L Building Regulations[7]

Since the 2013 edition of the Building Regulations in England, energy efficiency performance requirements are imposed on new and existing buildings as set out in Part L of Schedule 1 and in a number of specific Building Regulations. Technical guidance is in four Part L Approved Documents and two building services compliance guides. These set out requirements for specific aspects of building design and construction. Regulation 26 states that *"Where a building is erected, it shall not exceed the target CO_2 emission rate for the building"*, and

[6] EPBD: www.gov.uk/government/publications/2010-to-2015-government-policy-energy-efficiency-in-buildings/2010-to-2015-government-policy-energy-efficiency-in-buildings#appendix-6-energy-performance-of-buildings (visited: Apr-2016)

[7] Building Regulations in England 2013 Edition, Part L: https://www.gov.uk/government/publications/conservation-of-fuel-and-power-approved-document-l (visited: Apr-2016)

Schedule 1 – Part L Conservation of fuel and power states that such provision shall be made by: limiting heat gain and losses, providing building services which are efficient, have effective controls, are properly commissioned, and that information is provided so that the building can be operated efficiently.

Energy performance contracting[8,9]

An alternative form of financing energy upgrades from cost reductions is energy performance contracting. An external Energy Services Company (ESCo) implements a project to deliver energy efficiency, or a renewable energy project, and uses the stream of income from the cost savings, or the renewable energy produced, to repay the costs of the project, including the costs of the investment. The ESCo does not receive its payment unless the project delivers energy savings as expected. The approach is based on the transfer of technical risks from the client to the ESCo based on its performance guarantees. Thus, the ESCo's remuneration is based on demonstrated performance: the level of energy savings or energy service is the performance count grade. Energy performance contracting needs to be considered as a means to deliver infrastructure quality improvements to facilities that lack energy engineering skills, management time, capital funding, understanding of risk, or technology information. Cash-poor, yet creditworthy customers are therefore good potential clients. However, the ESCo concept is outside the research area of this PhD and is not discussed further.

UK Building Research Establishment Environmental Assessment Method (BREEAM)[10]

BREEAM assesses building performance in the following areas: energy use, health and well-being, innovation, land use, management, materials, pollution, transport, waste and water. The assessment process evaluates the procurement, design, construction and operation of a development against targets based on performance benchmarks. BREEAM assessments are carried out by independent, licensed assessors, and developments rated and certified on a scale of Pass, Good, Very Good, Excellent and Outstanding. During the assessment process, each category is subdivided into a range of issues, which promotes the use of new benchmarks, aims and targets. When a target is reached, credits are awarded. Once the development has been fully assessed, depending upon the total number of credits awarded, a final performance rating is achieved.

BREEAM was initially criticised for being overly prescriptive, providing too much detailed guidance on matters such as cycling facilities (8 pages long) or of the ecology allowed on site (25 pages long). However, BREEAM assessments were revised in 2011 to consolidate criteria and reduce the bureaucracy, detail and complexity required (James, 2011).

[8] European Commission Science Hub on Energy Efficiency: https://ec.europa.eu/jrc/en/energy-efficiency/eed-support/energy-service-companies (visited: Apr-2016)
[9] Energy performance contracts in the UK: https://www.gov.uk/government/publications/energy-performance-contract-epc (visited: Jan-2017)
[10] BREEAM website: http://www.breeam.com (visited: Jun-2016)

Design Quality Indicators

The Design Quality Indicator (DQI) process was developed by the Construction Industry Council (CIC) for evaluating and improving design and construction of new buildings and refurbishment of existing ones. Every aspect of design quality is assessed at each stage of the construction process, from inception to post-occupancy analysis (Construction Industry Council, 2014). The toolkit was launched online for UK construction on 1 October 2003.[11] DQI focuses on actively involving a wider group of stakeholders in building design. It involves not only the work of design and construction teams but all those who will use, finance and be affected by the building. DQI is designed to set and track design quality at all key stages of a building's development and incorporates post-occupancy feedback. It plays a fundamental role in contributing to improvements concerning design, construction, use and long-term functionality and sustainability of buildings.

Post Occupancy Evaluation

The BRE, CIC and other UK establishments such as the Building Services Research and Information Association (BSRIA) promote forms of Post Occupancy Evaluation (POE). This can be described as the process of obtaining feedback on a building's performance in use. The value of POE is being increasingly recognised, and it is becoming mandatory on many public projects. POE is valuable in all construction sectors, but especially healthcare, education, offices, commercial and housing, where poor building performance will impact on running costs, occupant well-being and business efficiency.[12] The BSRIA has produced guides for building performance evaluation in non-domestic buildings, with POE being one of its major parts (Bunn, 2013).

All aforementioned policies, legislation and tools help to address commitments made in the Climate Change Act 2008 for the UK to become a low-carbon economy. Most of these became effective at the time that the BSF programme was operational. Hence, as part of this research it is important to analyse their effects based on actual hard data delivered from assets.

2.2.3 Climate change consideration for education provision

The UK government has emphasised the need for efficient low-carbon school buildings to help achieve objectives set out in the UK Climate Change Act 2008 and EU 2020 Sustainable Development Strategy (Chatterjee and Reynolds, 2008; House of Commons, 2007; James, 2011; UK Parliament, 2008). The planning, design, construction, maintenance and operation, including transport to and from schools, is of social, economic and environmental significance (IBLF et al., 2009). Ten million pupils in the UK spend almost 30% of their life in schools and about 70% of their time inside a classroom during school days. In the UK, schools alone are responsible for 15% of the energy consumption in public and commercial buildings. Recent studies by Dasgupta et al. (2012) show that newly built schools through the BSF programme

[11] DQI Toolkit launch: http://www.dqi.org.uk/DQI/Common/031001_Launch.pdf (visited: Jun-2016)
[12] BRE website on POEs: https://www.bre.co.uk/page.jsp?id=1793 (visited: Jul-2016)

were failing to meet even basic performance criteria related to both energy consumption and provision of indoor environmental quality. The former Labour government had set challenging objectives for sustainable school buildings, culminating in the most ambitious target of zero carbon schools by 2016. Badi (2012) points out that while BSF was active, the need for BSF to act as a policy vehicle for change and deliver the government's sustainable energy objective was vital. This was also signalled by the Department for Environment, Food and Rural Affairs - DEFRA (2006), identifying BSF schools as a priority area and recommending that the then active Department for Children, Schools and Families (DCSF) and HM Treasury work together to ensure that new build school developments were meeting high environmental sustainability standards. The issue of sustainability was also highlighted by other policy organisations:

- the House of Commons, Education and Skills Committee noted that if the government was to meet a target of at least 60% reduction against the 1990 baseline, and if it intended to set an example by the way in which it looks after the public sector building stock, it had to address the issue of schools' carbon emissions (House of Commons, 2007).
- the DCSF Sustainable Development Commission reported carbon targets for new and existing schools in England where BSF and the Primary Capital Programme (PCP) were major vehicles for delivery of new build and refurbishment measures (DCSF, 2009), as displayed in Table 2-1 below:

Carbon standards for primary schools

	2010-12	2013-15	2016-24
New Build within PCP	40kgCO_2/m^2	10kgCO_2/m^2	0kgCO_2/m^2
Refurbishment within PCP	40kgCO_2/m^2	20kgCO_2/m^2	10kgCO_2/m^2
Refurbishment of schools not within PCP			10kgCO_2/m^2

Carbon standards for secondary schools

	2010-12	2013-15	2016 onwards
New Build within BSF	40kgCO_2/m^2	10kgCO_2/m^2	0kgCO_2/m^2
Refurbishment within BSF	40kgCO_2/m^2	20kgCO_2/m^2	10kgCO_2/m^2

Source: DCSF (2009)

Table 2-1: DCSF carbon standards for primary and secondary schools

- DCSF appointed a Zero Carbon Task Force in 2008 to advise on how new school buildings can be zero carbon from energy use by 2016. Although the task force established that it was impossible for all new schools to be zero carbon by 2016, it did support the ambition that all new schools would be zero carbon by 2018, in line with the wider ambition for all new public sector buildings. This long-term goal elaborated on the DCSF's requirement that all new BSF school buildings reduce carbon emissions by 60% compared to 2002 Building Regulations (DCSF, 2010).

Since the demise of BSF and the change in government in 2010, most of these organisations and their policies no longer exist. However, the above targets indicate the calls for the previous

Labour government to ensure that BSF schools played a key role in addressing climate change issues. It also exposes the fact that the targets set were opaque and perhaps overambitious.

The complexities of low-carbon school provision need to be further contextualised. First, the background of strategic PPP procurement systems is discussed in section 2.3 below, followed by some examples in the UK and ancillary frameworks in section 2.4.

2.3 Background of strategic PPP procurement for social infrastructure

The UK construction industry has been going through a phase of accelerated change and modernisation over a period of 20 years. One main strand is the development of PPPs, which range from major economic infrastructure projects to a variety of public buildings like schools and hospitals. Another strand is the drive to re-engineering the construction process as stimulated in three separate major visionary reports: Constructing the Team (Latham, 1994), Rethinking Construction (DETR, 1998) and Accelerating Change (Strategic Forum for Construction, 2002).

The British reform movement regarding construction is by no means a new issue. This debate is supported by a huge number of publications and initiatives, from the Latham and Egan reports to the establishment of Constructing Excellence (Fernie et al., 2006), Reading Construction Forum, Design Build Foundation, Construction Best Practice Programme, Movement for Innovation, Local Government Task Force, Rethinking Construction, BE, Construction Clients Group, and more recent initiatives such as Project 13 by the Infrastructure Client Group and Project X by the Infrastructure and Projects Authority. The Egan reports encourage the construction industry to focus on long-term relationships, supply-side integration and integrated teams to increase value to the customer. *"The (construction) industry must replace competitive tendering with long term relationships based on clear measurements of performance and sustained improvements in quality and efficiency"* (DETR, 1998, p. 5; Strategic Forum for Construction, 2002, p. 12). This statement, emphasised in two reports, seems to imply a fundamental concern for clients that what is being delivered is not meeting their expectations because of uncomfortable long-term relationships with their suppliers.

From the report Accelerating Change, a recommendation is that: *"the (construction) industry should create an integrated project process around the four key elements of product development, project implementation, partnering the supply chain and production of components. Sustained improvement should then be delivered through use of techniques for eliminating waste and increasing value for the customer"* (Strategic Forum for Construction, 2002, p. 12). Following this statement, another worry for clients might be how they can be sure that they can obtain the best possible value from their built assets.

Spencer and Winch (2002) point out that the construction of a new building is about the generation of new value, which involves the creation of an asset that can be exploited. In the private sector, one might expect the benefits from investment to provide financial return in the form of profit margin or Net Present Value (NPV). In the public sector, the value might be generated through long-term social or environmental benefit, equated against the capital cost expended on the investment to provide a measure of its cost-effectiveness, and other benefits such as whole-life VfM and environmental sustainability.

One distinct feature in strategic procurement is the management of a portfolio of projects, rather than a single project. Winch (2010) explains that each project requires a large number of different types of human and equipment resources which are held by the firms on the supply side (i.e. the resource base of the construction industry). The grouping of resource bases mobilised on the projects is based on shared objectives. Most firms supply resources to more than one project at once. In project portfolios, the projects are sponsored by the same owner and have to share the scarce resources (Winch, 2010). Managing the project portfolio is central to project strategy (Killen et al., 2012). The wider concept of strategic procurement is explained in detail in chapter 3.

2.3.1 Context of infrastructure

The role of infrastructure in public policy has been understood in many ways and encompasses many different aspects. The Office of Fair Trading (OFT) has attempted to take stock of a high number of definitions (OFT, 2011). A universally accepted definition cannot be drawn but it has been well documented in various ways in academic literature and policy debate. Helm (2006) suggests that one component of utilities and infrastructure is that they are an essential service. He defines essential as either meaning *"necessary for physical survival and politicians will always want to intervene if this is in doubt"*, or *"that the service is complementary to the rest of the economy, in the sense that it is an essential input to economic activity"* (Helm, 2006, p. 7). Frischmann (2005, p. 956) suggests a demand-based definition of infrastructure which includes the criteria that *"social demand for the resource is driven primarily by downstream productive activity that requires the resource as an input"* and that *"the resource may be used as an input into a wide range of goods and services, including private goods, public goods, and nonmarket goods"*. The criteria used by the OFT (2011) to define instrastructure were developed by analysing: Infrastructure UK's discussion of infrastructure characteristics, discussions around infrastructure in academic literature, and criteria that infrastructure funds apply for investments. One overriding theme across these sources is that infrastructure has an important role in the UK economy. This was reflected in Infrastructure UK's 'Strategy for National Infrastructure', which sees infrastructure as the *"economic backbone of the UK"* (HM Treasury, 2010, p. 3) and talks about its enabling role. For example, it states:

> *"[Infrastructure] is the fabric that defines us as a modern industrialised nation. The standard and resilience of infrastructure in the UK has a direct relationship to the growth and competitiveness of our economy, our quality of life and our ability to meet our climate change objectives and commitments"* (HM Treasury, 2010, p. 3).
>
> *"Infrastructure networks enable people, goods, energy, information, water and waste to move efficiently around the UK and, in some cases, across its borders. The extent, capacity and quality of these networks has a direct bearing on the economy of the UK, the environment and the quality of life of everyone who lives in or visits the UK"* (HM Treasury, 2010, p. 9).

A number of wider definitions of infrastructure are in **Appendix A**; however, for this research, a distinction needs to be made between social and economic infrastructure.

Social and economic infrastructure

Economic infrastructure tends to produce private goods, whereas social infrastructure often provides public goods. This research concerns social infrastructure. Besides, the focus is on physical assets, where tangible infrastructure has been constructed. Assets which may display the characteristics or meet the criteria, but which are not physical, are excluded. Social infrastructure is also referred to in some countries as public real estate, that is, public facilities such as schools, hospitals, administrative buildings, cultural houses, social housing, sports halls and arenas, and public pools (Weber and Alfen, 2010). Social infrastructure produces services that enter indirectly as common inputs to many industries. As with economic infrastructure, investment in social infrastructure can be suboptimal without government intervention due to the presence of pervasive market failures (Wagenvoort et al., 2010).

The provision of social infrastructure is integral to the creation of sustainable communities as it contributes much of the glue that holds communities together, providing services and facilities that meet the needs of residents, promote social interaction and enhance the overall quality of life within a community (BPF, 2010). Social infrastructure, at the deepest level, is not a static set of building blocks that serves a sort of fixed foundation for economic activity. Rather, social infrastructure is an organic relationship between communication technology, energy sources and users, thus creating a living economy. Communication technology is the nervous system that oversees, coordinates and manages the economic organism, and energy is the blood that circulates through the body politic, providing the nourishment to convert nature's endowment into goods and services to keep the economy alive and growing (Rifkin, 2011). Furthermore, it has been found that both social and economic infrastructure are essential to promoting better utilisation of physical and human resources, thereby leading to higher economic growth and improving quality of life (Hall and Jones, 1999).

2.3.2 Context of PPPs

Winch and Leiringer (2015), who refer to Morris (2013); Morris and Hough (1987), raise the important theme of the management of major infrastructure projects when assets are acquired by both the public and private sectors. In their paper about owner project capabilities for infrastructure development, they make a relevant point: *"infrastructure assets provide many*

different services and the [public and private sector] organisations that own and operate them typically have many contending opportunities for investment to extend their resource base, so how do they choose which ones go forward and thereby become projects and programmes?" (Winch and Leiringer, 2015, p. 3). A number of aspects are considered: selecting the most beneficial project, defining a project mission, raising the capital, managing the portfolio, managing stakeholders, and experience of the infrastructure agencies. One aspect to highlight pertains increasing difficulty for the public sector to raise capital to fund investment in upgrading infrastructure to meet 21st-century standards. Squeezed between high levels of debt, the cost of capital, resistance of voters to pay more taxes, and growing welfare claims, governments have been turning to PPP in an attempt to provide additional sources of capital for major projects (Hodge et al., 2010). Winch and Leiringer (2015) point out there is limited research on how forms of project finance, where a loan is secured on the asset being created by the project, shape the overall management of the project from an owner's perspective.

The notion of the term PPP has been associated with very different types of perceptions internationally. Weber and Alfen (2010) point out that the term was first used in the USA in the 1960s to refer to typical urban development projects involving private investors. Later, PPPs became known as a method of procurement for the public sector for social infrastructure and infrastructure management. Since 1992, PFI has become the form of PPP used most frequently in the UK and has been used across a broad range of sectors. This form of PPP was taken up throughout the world in various forms. More recently the UK has introduced a reduced version of PFI called Private Finance 2 (or PF2) (HM Treasury, 2012). One feature of particular interest to investors is that along with real estate or long-term fixed income securities, PFI can generate comparatively stable and predictable current income with moderate volatility and moderate risk relatively independent of macroeconomic development, even in difficult times. Due to its long-term nature, PFI also allows institutional investors (such as pension funds and insurance companies) to match the maturity structure of their liabilities. Infrastructure with this profile is a driving force behind its reputation as an attractive asset class: an attractive hybrid with similarities to equity, debt and real estate (Weber and Alfen, 2010). More about various types of PPP and its pros and cons are in section 3.2.

2.3.3 Private sector involvement in social infrastructure

Consistent infrastructure policies with a clear regulatory framework, good public governance and an adequate project pipeline are essential. The scale that pooled (or bundled, or portfolio, or strategic) procurement systems offer can alleviate this problem, and there are a number of live examples in the UK (sections 2.3.3 and 2.4.4) and abroad in education, healthcare, social housing and renewable energy sectors. Central to any investment decision-making process in the engagement of private sector involvement is the trade-off between the expected return in the form of an income stream and other benefits, and the capital investment required to realise those benefits (Spencer and Winch, 2002). Inderst (2015, p. 4) points out the high potential

for social infrastructure investment, especially in Europe, but flags a concern about the size of these projects: *"Projects in health, education and other social logistics are comparatively small. The average deal size of EU social infrastructure fluctuates between USD $100m and $200m. For large investors, they are often not worth spending their time on, as they keep competing for large, brownfield economic assets such as airports and utility networks."* In addition to size, he points out that the private sector needs to become more accustomed to characteristics of social infrastructure:

Funding: Cash flows come mostly from long-term availability payments by public sector. Some investors prefer such steady income streams to the user fee assets, where consumer demand can be very volatile.
Risk and return: Contract arrangements are seen as relatively low risk by investors, with single digit return projections. However, they are highly leveraged which can be yield-sensitive during downturns.
Portfolio diversification: Social infrastructure assets often show low correlation to other assets. There is also much less concentration risk than having a few big economic infrastructure assets in your portfolio.
Inflation-protection: Cash flows of social PPPs are often inflation-indexed which is useful for investors seeking real assets to match liabilities that are linked to inflation.
Investment vehicles: Infrastructure funds often mix social infrastructure with other sectors. Although a few have specialist products, smaller investors would need a more well-diversified (and cheap) portfolio.
Operational issues: Poor service quality and inefficiencies seem to be notorious in these sectors. Therefore, good contracts and management are paramount.
Regulatory, political and social risk: Change of government, regulation and renegotiations. There is also social risk and reputational risk if a project is opposed by pressure groups or media.
Risk-sharing: It is not easy to find the right and fair risk-sharing arrangements, and circumstances can change (Blanc-Brude, 2012). In the UK, for example, PFI was criticised for the private sector making windfall gains while risk transfer and future liabilities for the public sector are unclear.
Project pipeline: Investors increasingly bemoan the lack of a consistent supply of investable projects. This is particularly true for social infrastructure.

Source: Inderst (2015)

Overall, social infrastructure projects can have some interesting characteristics for investors but they can also be small and fiddly, and necessitate cost-effective investment vehicles.

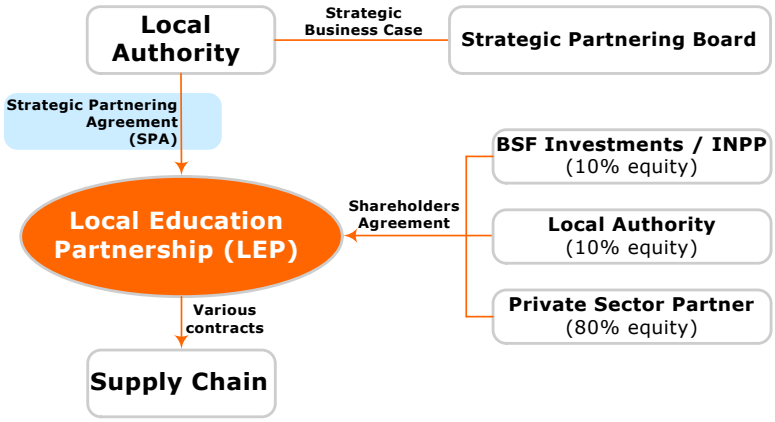
2.4 Strategic partnership procurement models in the UK

Below, a summary is provided of three examples of strategic PPP procurement systems for social infrastructure in the UK: the LEP, the LIFT, and the Scottish hub model.

2.4.1 Local Education Partnership

The LEP model was developed for BSF projects as a standard PPP delivery mechanism for projects to be identified in LA strategic plans. The standard model as shown in Figure 2-1 below provides the conditions for a local development and delivery company through which strategic BSF capital investment can be efficiently and effectively deployed by LAs into their development pipeline of schools estate (PfS, 2004b). As a limited liability company, LEP partners share capital and have a structure appropriate to such a company. A private sector investor owns 80% of the shares in the LEP. The remaining 20% is split equally between a LA (10%) and the government as public investors (10%). The equity structure was reduced to

10% public and 90% private following a buy-out of the government's equity stake by private equity fund International Public Partnerships Ltd (INPP) in 2011, after BSF was cancelled.



Adapted from:
PfS (2004c)

Figure 2-1: Standard LEP model structure

The 44 established LEP joint ventures that reached contractual close prior to July 2010 are now fully operational. When BSF was terminated, over 700 schools had received nearly £10bn investment through LEPs, or approximately 20% of the original programme (PwC, 2010; PfS website, visited 2010). As most LEPs completed their portfolio of pre-allocated capital funding by 2015, operational business activities have either been closed, postponed or scaled down into a short form version. Others continue to deliver operational FM or ICT contracts, or continue to have a pipeline of new build and refurbishment projects.

The BSF programme offered a standard business model for a LEP company (Figure 2-2 by PfS (2004c)), named the Integrated Services Provider with SPVs. The joint venture model relates to the extent to which the LEP takes commercial risk in delivering approved projects. The model enables a series of waves of investment in social infrastructure (especially schools) without the need for repetitive separate procurement. This structure was to meet the objectives of BSF effectively while being commercially viable. The expanded LEP contract structure is shown in Figure 2-2 (PfS, 2004c; PfS, 2008a). The SPA stipulates that the LEP has two strands of activity:

1. **New Project Development**: through the provision of partnering services to the LA, where it will work with the LA and other local stakeholders to identify suitable projects for subsequent phases.
2. **Delivery of Approved Projects**: procuring and delivering approved projects through a supply chain. The LEP will also manage the ongoing operational performance of the supply chain through benchmarking and periodically market testing.

The SPA allows the LEP to deliver approved projects either through PFI contracts or through conventional D&B, FM or ICT contracts. In case of PFI procurement, delivery is directed through Special Purpose Vehicles (SPVs). These SPVs are jointly owned by the LEP and its investors although the LEP is granted a controlling interest in the SPV during the construction phase and a number of years after construction. Thus, SPVs provide a LEP with the control

needed to ensure good performance across all the contracts for approved projects, which in turn helps them to maintain exclusivity and secure future works.

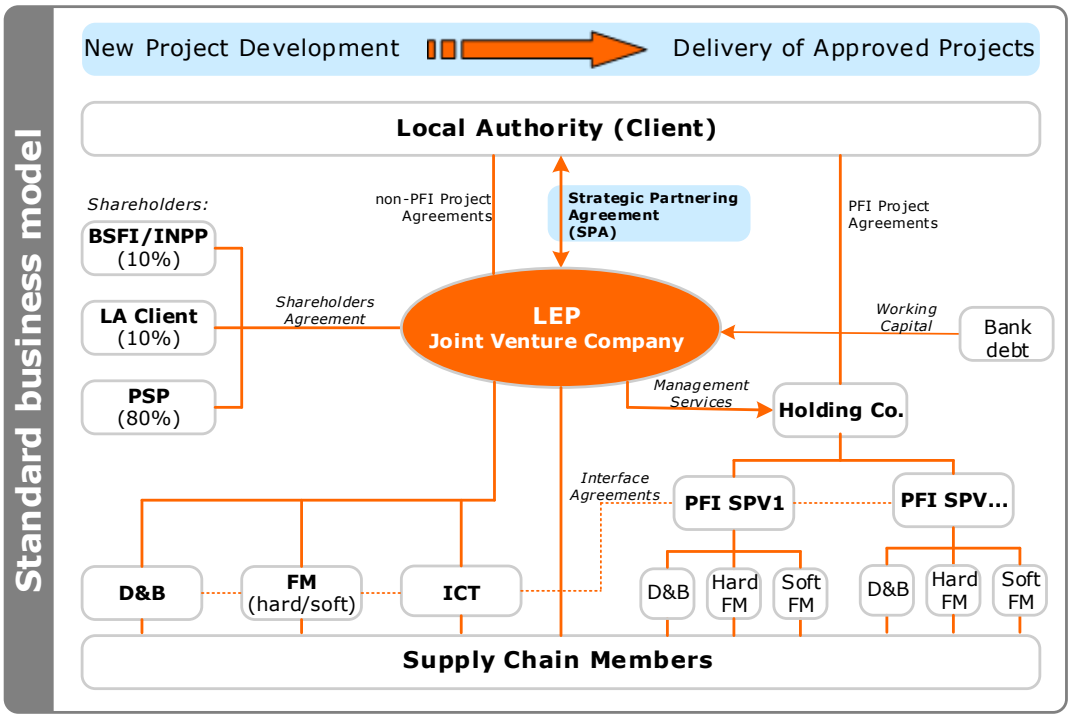


Figure 2-2: Detailed LEP business model for developing and delivering BSF projects

The economics of the LEP, the various contracts delivered through LEPs and the role of the SPA are further discussed in sections 2.4 and 2.5 of **Appendix C2**.

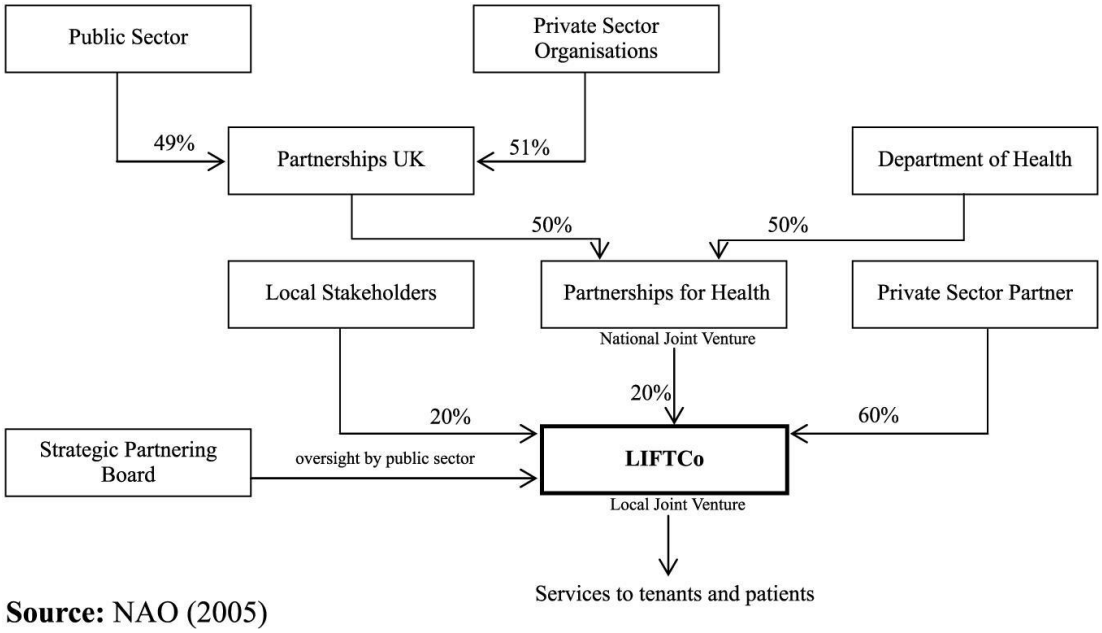
2.4.2 Local Improvement Finance Trust

The LIFT model was founded in 2000 as a vehicle for strategic partnership between the public and private sectors for regeneration and the development of facilities for NHS primary care and community services that would best meet the needs of local populations. The LIFT initiative provides public sector organisations with the means to upgrade existing facilities, and where necessary to develop entirely new premises and estates. Under the LIFT structure, facilities are refurbished or built and maintained by a local company (LIFTCo) – a joint venture between the public and private sectors, which has the responsibility for leasing facilities back to NHS England and maintaining the premises over the long-term.[13]

The LIFT model involves a similar but slightly less leveraged contract structure as with the LEP model, with the formation of a joint venture company; however, there is an equity structure of 40% public and 60% private for any dividends or future rewards (House of Commons, 2006; Kagioglou and Tzortzopoulos, 2010). The LEP model effectively operates a 10% public and 90% private equity structure following the government's 10% equity sale in 2011, which is a significant difference compared to LIFT. Research by Beamish and Lupton (2009); Dhanaraj

[13] LIFT and CHP websites: www.theliftcouncil.org.uk; www.communityhealthpartnerships.co.uk (visited Oct-2015)

and Beamish (2004) suggest that very small stakes below 20% signal a lack of commitment and increase the probability of a joint venture failure. The standard LIFT model is shown in Figure 2-3 below.



Source: NAO (2005)

Figure 2-3: Standard LIFT model structure

The original LIFT model was extended into BSF with the LEP model, so in essence it is a precursor to the LEP model. Aldred (2008b) explains the need to theorise what the rise of the LIFT and LEP models means for public services, and examines the potential resistance to it. The LIFT contract is based on similar principles to that of LEPs, with a SPA. In LIFT, the SPA provides a 20-year framework in which the partnership between LIFTCo and the public sector participants can operate. Fundamentally, the SPA provides for a LIFTCo to develop affordable VfM proposals for new projects to meet the needs identified by the public sector and for the private sector to provide additional services to complement those in the locality.[14]

CHP, previously called Partnerships for Health, is the delivery agency on behalf of the Department of Health for the 49 LIFT companies that are delivering facilities within areas of greatest need and bringing real health benefits to those communities. Investment to date exceeds £2.5bn and has delivered 339 facilities. CHP provides accommodation to over 1,400 tenants including GP practices, frontline LA services, libraries, pharmacies, fitness centres and a wide range of community and social care providers.

Cultural differences

Kagioglou and Tzortzopoulos (2010) devote a chapter about LIFT in a book by Groome (2010), which finishes with a section on cultural differences between the public and private sector. The 60–40% private and public shareholding in LIFT companies makes them less leveraged than LEPs, where there is an 80–20% balance (and since 2011, this is 90–10% following the buy-

[14] CHP website: www.communityhealthpartnerships.co.uk, (visited Dec-2015)

out of the 10% BSFI government stake). Groome explains that most lessons learned from issues during the development and construction processes for PPP projects arise from cultural differences between public and private sectors. He explains how successful PPP projects are delivered through LIFT, and the critical lessons learned:

Use of the public sector core team: Most PPPs have a central assurance team. This team monitors and checks the LIFTCo and also brings the projects through the approval stages. If the LIFTCo and the core team work together effectively and transparently (even co-located), then the Primary Care Trusts (now Clinical Commissioning Groups) have the reassurance they need. This is also the route to prove VfM on any scheme and/or necessary benchmarking.

Demonstrate delivery and cost performance: Trust naturally develops in the partnership when the LIFTCo demonstrates to the partners that when it states a cost, it maintains it, and when it promises a delivery date, the date is met. It may be possible for the LIFTCo to show this by minor capital works projects as well as on larger projects.

Use of the Independent Certifier (IC): The appointment of an IC (paid by the project but jointly appointed by the LIFTCo, main contractor and public sector, independent of the LIFTCo) is an important assurance for the future employers of the building. No matter what the main contractor or the LIFTCo says, the IC will not accept the new building if it does not conform to the employer's requirements. Additionally, if the IC accepts something, then the contractor and LIFTCo can be confident that they have done this part of the project correctly. A good IC appointment therefore prevents conflict and builds trust.

Risk: Especially crucial during project set-up, Groome cites Smith et al. (2009, p. 21): *"from the viewpoint of risk management, the appraisal phase is the most crucial"*. If project risks are appraised properly at the start and apportioned to the partners, then uncertainty is avoided at later stages.

Proactive legal teams: LIFT might provide a fertile area for legal practitioners, especially if public and private sectors are apart. To some extent, the Department of Health prescribes the standard documentation to such a degree that local variations have become difficult. Groome points out that the success of a project depends on the following:

> (a) the legal teams on both sides respecting and trusting each other;
> (b) the legal 'heads of terms' at the start of the project are correct; and
> (c) the risk matrix is agreed and understood by all.

The legal teams work at the end of the project process, so if a project is formulated badly, it could end badly and be expensive. Legal fees can increase by not agreeing a risk strategy and negotiating commercial terms up to FC. Legal teams cannot fix a bad deal; the parties need to involve them earlier in the process to confirm what a good deal looks like.

2.4.3 Scottish hub model

The hub model is an initiative by the Scottish Executive which was designed to enhance the delivery of local services (schools, social housing, leisure, community facilities, Council office accommodation) and improve procurement through strategic public/private sector partnering. The hub initiative is led by the Scottish Futures Trust (SFT), and reflects a national approach to the delivery of new community infrastructure which is valued at more than £2bn over its first 10 years (The Scottish Government, 2013). SFT is a company, established by the Scottish government in 2008, with responsibility to deliver VfM across public infrastructure investment. SFT works collaboratively with the Scottish government and other partners to focus efforts on achieving the very best value when money is spent on public sector infrastructure such as roads, schools and hospitals and more recently on non-traditional infrastructure such as digital (The Scottish Government, 2015).

There are five regional hubs in Scotland. These are institutional type PPPs (**Appendix C**, section 2.3) owned 60% by a private sector partner, 30% by public sector partners within each of the five territories, and 10% by the SFT. The rights to the private sector share in each of the hub companies were competitively tendered and a diverse range of public sector partners are involved, for example health, LAs, emergency services and registered social landlords.[15] The share structure of the hub model appears to be a blend of the LEP model due to the 10% government stake and the LIFT model due to the 60% private equity stake.

Strategic framework

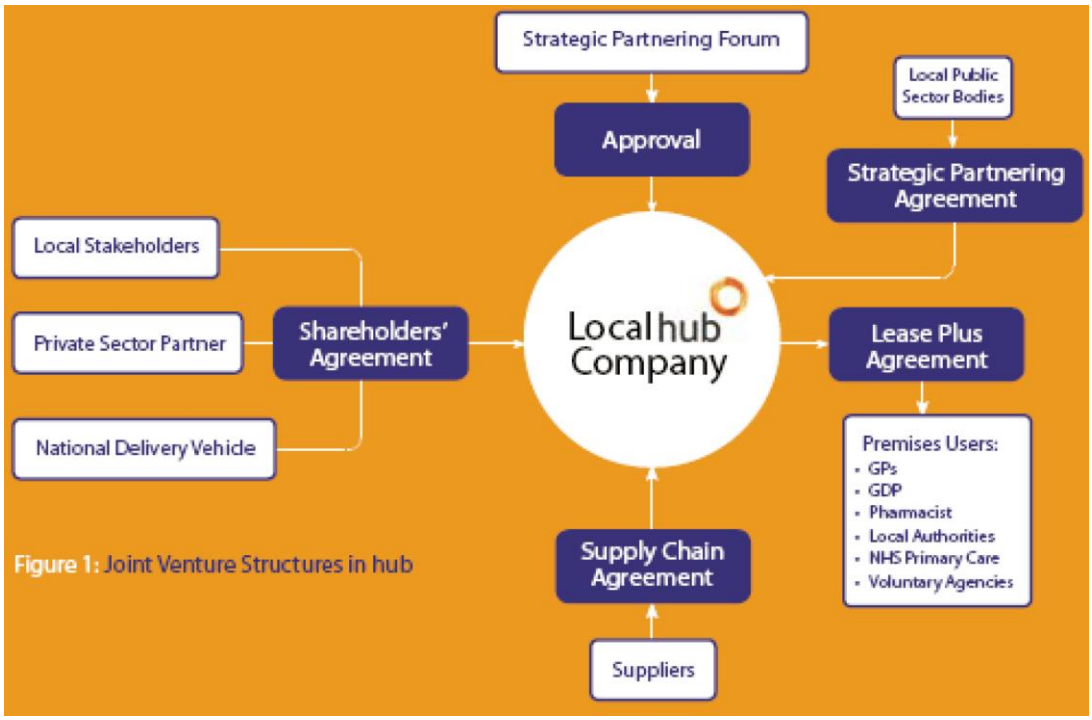
The hub Partnering Agreement (hPA) is an agreement between the local hub company and each of the local public sector bodies. The hPA creates a long-term strategic partnership between the hub company and each of the public sector parties to the hPA participants. Under the agreement, the hub company contracts to provide a range of estate management, estate planning and agreed associated services ('partnering services') for those premises it develops. The hub company can also make proposals (and, if successful, deliver) to serve some of the participants' accommodation needs in that locality. The hPA grants the local hub company a degree of exclusivity on any projects that it (or the participants) brings forward. The length of the hPA is expected to be at least ten years, with an option to renew on the same terms for a further ten years if the partners consider that the best route at the time.

Each hub company (Figure 2-4) takes a strategic, long-term planning approach to the identification of its infrastructure requirements to support the delivery of community services. The hub company provides a mechanism for delivering and managing assets, with a performance and continuous improvement regime to achieve better VfM, measured through Key Performance Indicators (KPIs). While projects are mostly new buildings, they can also include refurbishment and asset management of existing infrastructure.[16]

[15] Scottish Futures Trust website about hubs: https://www.scottishfuturestrust.org.uk/page/hub (visited: Dec-2015)
[16] Scottish Futures Trust website: www.scottishfuturestrust.org.uk (visited: Dec-2015)

Hubs are still relatively young (the first hub company was formed only in late 2012), and it is too early to pronounce definitively on their efficacy. However, there is real potential for hub companies to deliver VfM – building still further on framework agreements on the Egan principles of long-term partnering. Hub companies can also potentially get projects to market more quickly than traditional procurement exercises (The Scottish Government, 2013).

An 'exclusivity threshold' is set for the projects within each hub area, which means that the local hub company should be offered the first opportunity to demonstrate a VfM proposal for all relevant health board projects worth more than this threshold. A hub company's performance is monitored by its territory partnering board (made up of representatives of the public sector participants), and measured by a series of KPIs. These show whether hub projects are successfully delivering socio-economic and environmental outputs and benefits.



Source: Scottish Government, 2006[17]

Figure 2-4: Standard hub model structure

The NHS LIFT programme and BSF programme in England are precedents for the hub model. The Scottish government decided that rather than re-inventing a new policy, the hub company initiative would use the LIFT procurement model, adapting it to the distinctive requirements and challenges in Scotland. The hub model also built on the lessons learned in implementing LIFT, including responding to the findings of reports already published by the NAO and PAC. Key commercial issues were also considered within the context of the NHS LIFT and BSF programmes in England. Hub was created as an evolution of existing policies, recognising that the consultations already undertaken on the LIFT/LEP approach provided considerable learning from previous developments and a firm foundation on which to build (The Scottish Government, 2006).

[17] Scottish Government website: www2.gov.scot/resource/doc/924/0041326.pdf (visited: Dec-2015)

2.4.4 Ancillary strategic PPP frameworks

Priority School Building Programme

It was announced in 2015 by the DfE that 261 schools would be rebuilt or refurbished under the PSBP. Of the 261 schools, 42 were funded by a £400m capital grant and work would start immediately. The remaining 219 were funded through a reformed PFI structure called PF2. The complete programme costs approximately £2.4bn and fits in the government's strategy of focusing capital spending on those schools most in need of investment. PSBP makes use of batched procurement to attract private investment using traditional and PF2 procurement. For the PF2 element, an innovative aggregator model has been developed by the DfE and investment fund International Public Partnerships (INPP) to attract lenders to invest in bundles of assets rather than single projects. By aggregating funding requirements, the DfE has been able to access cheaper finance and streamline procurement by using standard finance documents for each batch of schools.[18]

ProCure21+ framework

Slightly dissimilar to LEP, LIFT and hub is the NHS ProCure21+ National Framework, a framework agreement with six principal supply chain partners and their supply chains, selected by the OJEU tender process for capital funded construction schemes. One important characteristic similar to the aforementioned strategic procurement systems is that any NHS client or health joint venture may use the NHS ProCure21+ framework for a capital construction scheme or portfolio without having to go through the OJEU process themselves.[19]

Since the start of the original ProCure21 framework in 2003, over 600 schemes (collectively worth £3.5bn) have been completed, with consistent time and budget compliance of over 90%. Client satisfaction has also been consistently over 80% with no litigation on any ProCure21 or ProCure21+ scheme. This represents a step change for public sector construction, where in 2001 only 26% of schemes were delivered on time, and 28% on budget.[19]

NHS clients manage their own ProCure21+ schemes, but follow the proven ProCure21+ procurement process and contract template (based on the NEC3 Option C Contract). Both the process and contract have been tailored to reflect the NHS business case approval process, giving clients control mechanisms to ensure their scheme remains on budget at each stage, with break clauses (without penalty) throughout the design and development period. Clients can use the process and the partnership working relationship with their supply chain to drive as much long-term VfM as they can.

When a final design is agreed, costed and thoroughly market-tested, the client is given a Guaranteed Maximum Cost (GMC) for the scheme. This limits the client's liability to price

[18] PSBP in England website: www.gov.uk/government/publications/psbp-overview/priority-school-building-programme-overview (visited: Dec-2015)
[19] ProCure21+ website: www.procure21plus.nhs.uk (visited: Dec-2015)

increases, risks and poor performance. If the scheme is delivered below the budget, a gain share mechanism shares the savings 50:50%. Any overspend (that is not a client-instructed change) is borne 100% by the supply chain.

There are a number of challenges that needed to be addressed for a successful ProCure21+ framework implementation:[19]

- Encouraging clients to engage with the framework and the supply chains early enough in the design process. Where a scheme is presented with an almost complete design, the potential for savings is vastly reduced.
- Getting buy-in from senior NHS managers, particularly in finance departments, to encourage greater visibility in decision-making and to understand where additional and perhaps unnecessary costs lie.
- Encouraging clients to share designs and other information. Under the ProCure21+ framework, clients have a royalty-free licence to use any existing designs developed under the framework.

Beyond social infrastructure

Strategic procurement frameworks can also be utilised for economic infrastructure (highways, rail or civil sectors). Economic infrastructure was defined in section 2.3.1 and in **Appendix A**. Examples in the UK include London Olympics 2012,[20] Crossrail[21] and Heathrow Terminal 5. These frameworks are sometimes also referred to as strategic alliances, an arrangement where a collaborative and integrated team is brought together from across the extended supply chain. The team shares a set of common goals which meet client requirements and work under common incentives (HM Treasury, 2014). As arrangements are cascaded through the supply chain, they will remain back-to-back with agreed client outcomes and requirements. Alignment of outcomes should apply to the extended supply chain (HM Treasury, 2014, p.5). While this research is focused on strategic procurement of social infrastructure, some principles may be transferable to economic infrastructure procurement, where there is a portfolio of projects and a whole-life value approach.

The policy and practice of strategic partnership procurement in construction does not only exist in the UK. There are many examples of bundled PFI/PPP projects for social infrastructure in various shapes and forms, not only in the main PPP markets in Europe, Australia and Canada but also in the USA, South America, South Africa and Asia Pacific. However, the UK policy is known as the most advanced and biggest in terms of capital investment. The EPEC European PPP Expertise Centre and EIB Projects database provide an up-to-date snapshot of existing PPP projects and future pipeline, some of which have portfolio, pooled or bundled structures, a distinguishing aspect of strategic procurement. One example where a strategic PPP procurement structure was applied at the programme level (as opposed to project level) was for a Design, Build, Finance, Maintain (DBFM) programme for 200 schools called ‘Scholen van Morgen’ [Schools of Tomorrow] in Flanders, Belgium.

[20] London 2012 Olympics learning legacy website: http://learninglegacy.independent.gov.uk/ (visited: Jan-2016)
[21] Crossrail learning legacy website: http://learninglegacy.crossrail.co.uk/ (visited: Feb-2016)

2.5 Context of education capital in England

The DfE was formed in May 2010 by the then incoming Conservative/Liberal Democrat coalition government taking on the responsibilities and resources of the DCSF. The DCSF was created in June 2007 following the demerger of the Department for Education and Skills (DfES). The DfES operated under the former Labour government between 2001 and 2007.

From April 2012, the DfE's EFA is responsible for rebuilding and renewing state-funded schools. Prior to that, PfS and Partnerships UK (which later changed its name to Infrastructure UK and again in January 2016 to the Infrastructure and Projects Authority or IPA) were responsible for delivering education capital programmes. Originally, Partnerships UK was formed in 2000 by HM Treasury (UK's economics and finance ministry) and was a joint venture that bridges the gap between public and private sectors. A number of infrastructure policies have operated under the direction of the above organisations and have relevance for this research:

- PFI Schools programme;
- Building Schools for the Future programme;
- Academies programme; and
- Primary Capital Programme

Each of these is described in further detail in the sections below. This section solely sets out the capital programmes that were linked to or amalgamated with BSF. **Appendix C1** provides detailed insights of the strategic procurement policy under BSF from when the programme was implemented in 2004 until it was summarily cancelled in 2010. Included are the complex contractual structures needed to successfully deliver a standard LEP model in practice. A further review of other major school capital initiatives over the last 50 years prior to BSF is included in **Appendix D**.

2.5.1 PFI Schools programme

In 1996/97, annual capital investment in school buildings was running at only about £900m per year, including central government support, proceeds of asset sales and LA revenue budgets. Since then the government has committed significant additional capital funding for the schools sector. The New Deal for Schools programme announced in 1997 provided specific grant support for projects to improve the condition of the building stock. The funding was split between traditional routes, an extension of the New Deal for Schools programme, and additional support for PFI projects (DfEE, 1999):

- £1bn to address the worst elements of the repair and maintenance backlog in schools in England;
- a further £90m in 1998/99 for specific initiatives to reduce infant class sizes, eliminate outside lavatories and improve heating systems;
- additional £1.5bn for schools capital following the Comprehensive Spending Review; and
- more than £1bn to support PPPs in schools.

The New Deal for Schools programme has seen over 800 schools and some 100 PFI contracts signed, and was subsequently replaced by BSF. For these PFI schools, the emphasis is now on servicing existing school contracts under their agreed maintenance and operation terms (AMA Research, 2007). The PFI contracts comprise bundles of schools, all of which have now been in operation for over ten years with long-term facilities management contracts in place.

In 1999 and 2000, various announcements were made about the New Deal for Schools, which focused on the repairs backlog and the replacement of temporary classrooms. The capital programme took on a different dimension later in 2000. The then DfES announced capital expenditure of £7.8bn for the years 2001/02 to 2003/04. As well as money for extensive repairs and modernisation, and a sum given directly to the head of each school for more routine expenditure, the funding was to be used to completely transform or replace 650 schools, both primary and secondary. By this time the government had committed approximately £10bn to be spent on school repairs and rebuilding since coming into office (House of Commons, 2007). The New Deal for Schools programme naturally transitioned into the BSF programme, without any major political controversies.

2.5.2 Building Schools for the Future programme

The BSF capital programme was a major government secondary schools renewal initiative in England. It was announced by the DfES (later transferred into DCSF) in February 2003:

"The aim of BSF was to rebuild, renew and/or refurbish all 3,500 education facilities in England over a 10 to 15 year period from 2005-06 with all Local Authorities benefiting from the funding, subject to future public spending decisions" (DfES, 2003a; NAO, 2009)**.**

That above ambition would translate into almost one school being rebuilt, renewed or refurbished every 36 hours. However, with the programme cancelled in 2010, only 700 schools were actually built between 2004 and 2015. Originally, BSF was the largest and most ambitious scheme of its kind. It aimed to transform education for some 3.3 million students aged 11 to 19 (James, 2011). At the time, BSF was the biggest single UK government investment initiative in improving school buildings for over 50 years (PwC, 2010). Delivery agency PfS worked in collaboration with LAs and private sector partners to rebuild and renew all of England's public secondary schools to 21st-century standards during the 15-year lifetime of this programme from 2005/06 with a capital expenditure of £52bn to £55bn, subject to future public spending decisions. This was a 16% to 23% real increase from original estimates of £45bn (NAO, 2009). Until cancellation of the programme in 2010, approximately £10bn of capital was spent on new build or refurbished schools. BSF aimed to ultimately reach every part of the English secondary school system, including:

- 11–16, 11–18 and upper schools, middle schools deemed secondary, and secondary special schools; and
- all categories of secondary schools: community, controlled, aided and foundation.

PfS strongly recommended that LAs establish local entities specifically focused on achieving the aim of BSF, through (PfS, 2004b, p. 31):

1. a long-term partnership to achieve local strategic investments, aligned with other measures to transform secondary education;
2. integrating investment in buildings, through a variety of procurement routes to achieve Best Value for Money, with investment in ICT and ongoing maintenance of assets over their whole life; and
3. the benefits of long-term partnering with the private sector, achieving efficiencies in procurement and delivery to which the government was committed.

The scale of BSF enabled LAs to move from patch-and-mend capital spending on schools to rebuild and renewal, with a more strategic approach to funding, design, procurement and management of assets. Moving away from one-off investments into schools, BSF was to take a more strategic view for reforming the entire schools estate. As such, LAs were expected to plan strategically to help deliver "education transformation" and "transformational change" (DfES, 2003b; DfES, 2003a; DfES, 2005):

- improving diversity, choice and access;
- targeting underperformance;
- personalising learning;
- implementing the government's 14–19 agenda;
- improving inclusion and integrating Children's Services in and around schools, as part of the Every Child Matters agenda;
- increasing use of ICT for learning and information management; and
- implementing workforce reform.

BSF was not just about building schools; it also focused on transformation of education, children's services and helping to bring about a step change in the performance of pupils. This was to be achieved by high-quality curriculum options, ICT to change the way of learning delivery, high-quality design, community use outside school hours and excellent diversity and accessibility solutions. Each LA had to prepare its own educational vision to offer innovation and educational transformation (PfS, 2004b, Annex C).

Partnerships for Schools. PfS was a non-departmental public body that was owned by the government's DfES (former DfE) and jointly funded by DfES and PUK. In 2006, PfS published that its aim was to act as *"the delivery vehicle for BSF by working with LAs and their stakeholders to ensure that each rebuilding programme is based on strong educational visions, and that BSF schools are well designed, built on time at a reasonable cost to the taxpayer, sustainable and properly maintained over their lives"*.[22] In its 2005/06 business plan, it cited that: *"PfS exists to enable the procurement and delivery, at local level, of a national programme of 21st century teaching and learning facilities, and regularly refreshed technology systems"*. Its purpose was to enhance the effectiveness and efficiency of investment through the BSF programme, thereby promoting and enabling transformational change in secondary schools (PfS, 2005a, p. 28). From 2009, PfS took on responsibility for delivering all schools

[22] Public Service Review, Issue 8: Education matters (2006)

capital investment programmes including the Academies Programme, Primary Capital Programme, Voluntary Aided Capital Programme and initiatives such as Free Schools, Studio Schools and University Technical Colleges. In its 2011/12 business plan, after the then newly elected coalition government was appointed in July 2010 and the James Review was published in April 2011, PfS cited a more modest quote from the Minister for Schools in 2003, that PfS had been established to *"support LAs in ensuring that new schools are well designed, built on time and at a reasonable cost to the taxpayer, and are properly maintained over their lives"* (PfS, 2011, p. 5). The EFA is responsible for the operation of the education capital and revenue funding system and the delivery of capital programmes, including the BSF legacy (DfE, 2012a). This chronology highlights the pace at which change in government policy has evolved over recent years.

Educational vision. BSF was not just about building schools, but also focused on helping to bring about a step change in pupil performance, a long-term programme to transform education where each LA had to prepare its educational vision to offer innovation and educational transformation. It was one of the approval criteria for councils to receive funding. The vision was the absolute starting point for proper stakeholder engagement and scoping of a BSF project (PfS, 2004a). In BSF projects, the educational vision statement had to include:

- high-quality curriculum options;
- ICT provision;
- sustainability, especially the requirement to achieve a BREEAM score of Very Good or higher;
- number of school places;
- flexible buildings and classrooms which can adapt to changing sizes or other needs;
- community use outside school hours; and
- diversity and accessibility issues.

LAs had to submit their educational visions prior to the submission of their Strategic Business Case (SBC), often referred to as a Strategy for Change (SfC), as shown in Figure 2 in **Appendix C**. DfES assisted LAs to ensure their vision for educational transformation was appropriate, robust, met ministers' expectations for BSF and worked for local children and learners. It was important that the local visions provided a clear overall strategy for raising educational standards, as well as addressing the individual policy areas.

Prioritisation of BSF capital funding. The BSF programme was introduced with 15 separate waves[23] of LAs from 2004 until 2016, whereby funding was prioritised to the LAs with the greatest need. The division of the BSF funding depended on locally agreed plans. Authorities could also add their own resources to BSF projects above the level supported by central government funding. At a national level, DCSF provided funding on the basis that within each BSF project:

- **50% of the floor area could be new build;**
- **35% of the floor area could be a major refurbishment; and**
- **15% of the floor area could be a minor Refurbishment.**

[23] More information about BSF waves and tranches is in **Appendix A** and **Appendix D**.

Each LA's capital allocation was guided by this pattern. The proposals for each individual or group of schools had to be developed by the LA and the schools together. These proposals were based on DfES Building Bulletin 98 (BB98), on master planning and on the LA's asset management plan which had been developed for every school over the prior years, in order to assess the condition, suitability and sufficiency (net capacity) of their premises (DfES, 2004). The proposals were also based on the submission made by the LA to DfES when BSF was first announced, which was the basis for prioritisation nationally. The LA's strategy in deciding which and to what extent schools would be new build compared to other schools in the area was guided by:

1) the greatest improvement in educational outcomes;

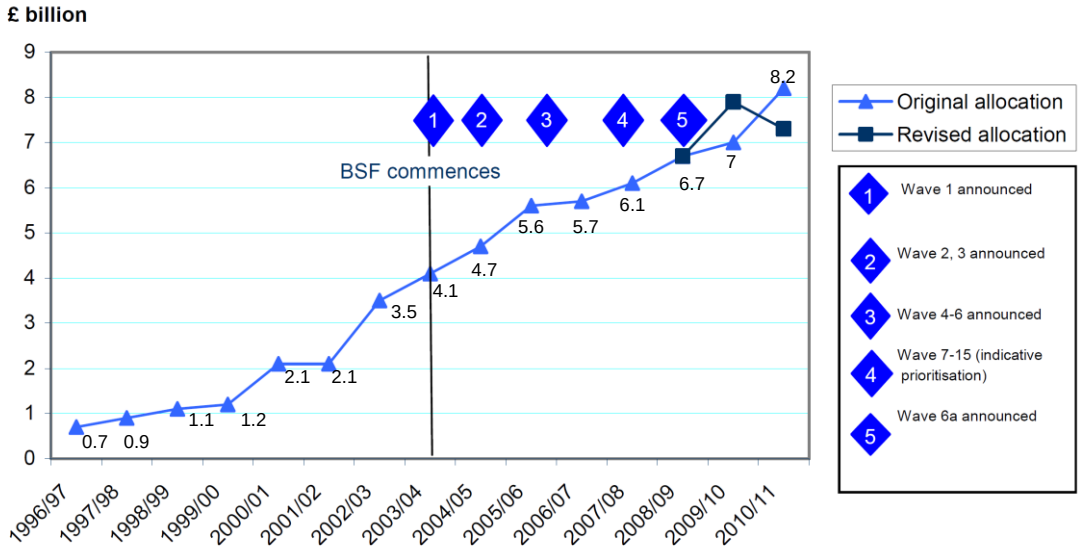
2) the best VfM on a whole-life cost basis.

In BSF, Whole-Life Cost (WLC) in relation to any project was defined as the estimated and (to the extent that such information was available) the actual cost of operating and maintaining that project over its intended design life (PfS, 2008c). As the programme needed to operate within the overall budgets, the 50:35:15 funding formula was applicable to all projects within a wave. Authorities that wanted to bring forward a greater number of new build schools by swapping them between waves were only able to do so under restricted conditions. Once the funding envelope was agreed in line with the SBC, the DfES offered no further funding for the prioritised group of schools.

The funding amount for a prioritised group of schools was generated by calculating the gross internal floor area (GIFA) for the current number of schools in the group using the proposed number of pupils registered for each school in the LA's Education Vision. The BB98 dictated a number of pupils per m^2 floor area based on a forecast of ten years.

All BSF funding was allocated and paid to the LA and not directly to any school. This was to ensure that the contractual relationship with the private sector partner was through the LA. Schools that had been built in the last 15 years did not require further investment, and did not count towards BSF funding allocation. Schools that had recently been remodelled could receive up to 75% of the funding allocation. However, funding could only be provided where they had to be enlarged because of an expected increase in pupil numbers.

The capital expenditure on schools estate had increased more than seven times since 1996/97 when capital budgets reached £683m. In 2005/06, this budget had increased to £5.6bn. This amounted to almost a ten-fold increase and represented one of the largest growth markets for the UK construction industry (PwC, 2008). Figure 2-5 shows an overview of the actual total capital investment allocations over the period 1996/97 to 2010/11 (PwC, 2010).



Source: PwC (2010)

Figure 2-5: Investment in school infrastructure

Of all the government funding made available for schools capital investment, BSF accounted for approximately £9bn up to 2010/11 (of the £11bn available for long-term investment programmes). On average, £2.5bn to £3bn of capital was spent on the programme each year. While BSF funding was one of the most important sources of school funding during this period, it was only part of the picture as a major share was spent on educational projects outside BSF.

BSF comprised a mixture of conventional procurement and PFI. Once a BSF project was signed, the LA received financial support towards the cost of its PFI projects through PFI Credits from the government. This contribution was intended to cover the repayment of capital and lifecycle maintenance. The LA covered the remainder of the charge: the affordability gap. The revenue support was a contribution to the unitary charge that the LA was contractually committed to paying to its PFI contractor. BSF funding was available for investment in every school in a LA that teaches secondary age pupils. The programme did not fund Further Education (FE) colleges or Sixth Form centres operating under FE regulations.

2.5.2.1 Political viewpoints of BSF

A historic review of the political climate on education policy since the 1950s is in **Appendix D**. In essence, prior to the 1990s, public spending in general was constrained, people in receipt of benefits were negatively portrayed, public services were subjected to market reforms and professionals who worked in them were portrayed as self-serving, lazy and incompetent (Mahony and Hextall, 2000). Some viewpoints from the last three governments are summarised below.

Labour (1997–2010)

In a statement from one of the Labour Party's chief policymakers, Peter Mandelson, its education policy would make Britain "a more equal society" (Mandelson, 1997, p. 7). Mahony and Hextall (2013) cite Hills et al. (2009), who trace the impact of Labour's policies from 1997

to 2007: "*The Labour government that came to power in 1997 inherited levels of poverty and inequality unprecedented in post-war history. More than one in four UK children lived in relative poverty, compared to one in eight when Labour had left office in 1979.…Unlike every other post-war decade, in which the gains of economic growth were shared across income groups, growth in the 1980s benefited the richest most and the poorest least"* (Hills et al., 2009, p. 2).

Tony Blair, former leader of the Labour Party, sought to distance New Labour from old Labour by positioning it within a 'Third Way' of politics, which he described as drawing from: *"democratic socialism and liberalism. Liberals asserted the primacy of individual liberty in the market economy; social democrats promoted social justice with the state as its main agent"* (Blair, 1998, p. 1). BSF was intended to play a key part in New Labour's overall educational and social policy. "Education, education, education" was how Tony Blair set out his priorities for office when he campaigned for Labour (website BBC News, 14 May 2007).

Conservative/Liberal Democrat coalition (2010–2015)

The BSF implementation process was deeply criticised by the DfE Review of Education Capital by James (2011), the Public Accounts Committee (2009) and NAO (2009) to be expensive, bureaucratic, overly complicated and even wasteful. As the £55bn programme was subject to Comprehensive Spending Reviews and elections, multiple waves were developed to roll out building projects, which was widely regarded as horrendous. Project delays allegedly led to frustration on the part of headteachers (PwC, 2010) and it was still unknown whether the LEPs, established to deliver BSF, actually offered best VfM. All of these underpinned the coalition government's decision to close the BSF programme in July 2010.

The coalition government warned that education would not be exempt from the severe cuts in public expenditure it was planning. The biggest budget cuts affected the BSF programme. Plans for the rebuilding or refurbishment of hundreds of secondary schools were put on hold. There was a tremendous drive to make savings from the £8.5bn annual budget for new schools, and some of the money would be utilised to fund Minister Gove's policy on Free Schools, to remove LA control by turning every school into the status of an Academy, and the launch of its own PSBP in 2010 (The Guardian, 14 May 2010). A crucial aspect of PSBP is the Property Survey Database of all secondary schools in England created by a framework of Quantity Surveyor (QS) firms. Based on the detailed condition levels of the assets surveyed, it would be decided what schools are prioritised to receive capital under PSBP. All of this pointed towards a buildings-based orientation and an affirmation of the move away from any form of transformational agenda (Mahony and Hextall, 2013).

Despite the difference between the overall growth rate of education capital spending delivered by the last Labour government versus the coalition government, there is actually a remarkable similarity in the two governments' apparent relative priorities. Common to both records on education spending is a shift in public spending away from higher education towards schools.

	Average annual real increase
Labour	
Labour years: April 1997 to March 2010	+4.2
Labour 1: April 1997 to March 2001	+2.9
Labour 2: April 2001 to March 2005	+6.2
Labour 3: April 2005 to March 2010	+3.8
Conservative	
April 1979 to March 1997	+1.5
Long-run trend	
April 1956 to March 1997	+3.7
Projected under Spending Review 2010	
April 2010 to March 2015	–3.5

Sources: Chowdry and Sibieta (2011), who cite HM Treasury, Public Expenditure Statistical Analyses 2011; Office of National Statistics, Blue Book; and Office of Budget Responsibility[24]

Table 2-2: Increases in UK education spending

Based on these forecasts, education spending as a share of national income would drop from 6.2% in 2010/11 to 4.6% by 2014/15. This would return it to a level last seen in 1999/2000, which in turn was the lowest level since the mid 1960s (Chowdry and Sibieta, 2011).

Conservatives (2015 to present)

The present government equally condemns the legacy policy of BSF, like the previous coalition government. It continues to deliver new schools under the PSBP. On the DfE website, it states that: *"thanks to the PSBP, school buildings are being rebuilt faster and cheaper than those built under the previous school building initiative – BSF. Under the BSF it took three years for construction work to begin. This was slashed to one year for the PSBP, with projects costing around a third less"* (DfE website, visited January 2016).

PSBP is a much smaller capital programme at about a tenth of BSF (£4.4bn). The aim of PSBP is to only rebuild or refurbish those schools or individual school buildings in the very worst condition. There is a tremendous focus on (House of Commons, 2015):

Cost efficiency, by looking for savings in all areas. These savings mean that more schools could benefit from the programme. DfE claims that schools delivered through the PSBP are costing 33% less compared to those delivered through BSF. This is mainly achieved by the three measures below.
Baseline designs that are eminently replicable to reduce development and design costs, and ultimately drive economies of scale as materials and build methodologies become standardised.
Reduction in floor areas, which is largely achieved by maintaining the same space in teaching areas, but providing the most efficient possible use of ancillary spaces, in particular circulation areas, to reduce the overall area and cost of the building.
Delivering to faster timescales, by reducing overall pre-procurement and procurement time through a simpler bidding process. Typically, pre-procurement time has been reduced by 44 weeks for schools procured under PSBP compared with BSF timescales and procurement time has been reduced by 64 weeks. This means that the total time saved for construction work to start is therefore two years.

2.5.2.2 Wider criticism about BSF

The cancellation of BSF caused lots of grief with LAs and the supply industry who had to abruptly adjust their organisations to cope with austerity measures imposed by the 2010

[24] Office of Budget Responsibility website, Economic and Fiscal Outlook, using GDP deflators from March 2011: http://budgetresponsibility.independent.gov.uk/economic-and-fiscal-outlook-march-2011/ (visited: Jun-2012).

coalition government. Many LEPs that had reached FC prior to the cancellation had a pipeline that was slashed sometimes with only half left of what was originally envisaged. England's construction industry faced a shake-up when BSF was scrapped. Many bidding contractors were halfway through the procurement process of bidding for work that was suddenly no longer there. About 44 LEPs managed to retain and deliver a pipeline of projects. Twelve LEPs have been selected for further research as outlined in chapter 7.

The central document that articulates the major areas of criticism about BSF is the DfE Review of Education Capital (James, 2011). Several other critical reports that arrived prior to and after the DfE Review of Education Capital were reviewed (House of Commons, 2007; House of Commons, 2015; NAO, 2009; Public Accounts Committee, 2009; PwC, 2008; PwC, 2010; Shaoul et al., 2013). These are summarised in **Appendix C3**. Recurring themes in the reports are a lack of clarity about the costs associated with BSF projects, a need to demonstrate VfM, complex nature of LEPs and a missed opportunity if lessons learned are not taken on board.

2.5.3 Academies programme

The Academies programme was introduced by the Labour government in March 2000. In September 2002 the first three city academies were opened. The five-year plan indicated that the government intended to have 200 academies open by 2010, even though no evaluation had been made of their cost-effectiveness.

In 2006, the responsibility for delivering the Academies programme was transferred from the DCSF to PfS, and in doing so, was integrated into the wider BSF programme. The Academies programme aimed to challenge the culture of educational under-attainment and to deliver real improvements in standards. Most academies under the former Labour government were located in disadvantaged areas. They either replaced one or more existing schools that were underperforming or were built where there was a need for additional school places.

Academies are all-ability schools established by sponsors from business, faith or voluntary groups working in highly innovative partnerships with central government and local education partners. The DCSF funded the capital and running cost for the academy in full and the sponsor and principal designate were fully involved in the design of the school (PfS, 2010a). After BSF was cancelled, the 2010 coalition government further encouraged the establishment of academies, not so much as a building programme, but as a change of legal entity called Free Schools. The Conservative government had plans for each LA-maintained school to convert into academy status. Although this policy was not adopted in the Education Bill 2016, it was still highly recommended by the government (Mason, 2016). Academy status involves a constitutional change to a new legal entity (Charitable Trust) either in the form of a single academy trust or multi-academy trust. It also triggers changes to the funding, governance structure and branding, but nowadays, to a lesser extent, to any capital investment in new build or refurbishment. Those academies previously created under the original programme

involving an element of private finance are now in operation with long-term FM contracts in place.

2.5.4 Primary Capital Programme

There are more than 17,000 maintained primary schools including all-through, separate junior and infant schools, community, foundation and voluntary schools. Some primary schools have just 30 places, while the largest have over 900. Almost four million pupils attend primary schools around the country. Plans for the Primary Capital Programme were announced by the DfE in 2005. The aim was to create primary schools that are equipped for 21st-century teaching and learning, and are at the heart of their communities with children's services in reach of every family. The long-term aims and initial investment priorities for the programme were:

- the worst 5% in terms of condition to be rebuilt or decommissioned;
- at least 50% of all primary schools to be rebuilt, refurbished or remodelled;
- target deprivation to locally determined criteria; and
- all remaining primary schools' needs to be met through devolved formula capital.

The programme was to invest capital to renew or refurbish at least half of all primary and primary-age special school buildings by 2022/23. The programme was migrated into BSF in 2008, but then cancelled along with the rest of the programme in 2010 (PfS, 2010c). Those primary schools previously created under the original programme involving an element of private finance are now in operation with long-term FM contracts in place.

2.6 Summary of chapter 2

This chapter commenced with an exploration of the wider socio-economic background of two public policy initiatives in the UK that were introduced by the last Labour Party government but heavily criticised by the governments that followed, namely that of addressing the danger of climate change with the UK Climate Change Act and wider European and global targets, and the use of strategic PPP procurement models for renewing elements of social infrastructure. While both policies seem entirely separate, social infrastructure is a significant part of the UK built environment. Real incentives are created by public clients to reduce energy consumption and improve environmental performance during the full asset life. Private investment and finance in procurement of public infrastructure thus far represents only a small proportion of publicly funded capital investment. Despite this, attention received on the effects of operational PPPs is disproportionately high considering the public resources dedicated to them. It is pertinent that future investment via PPP/PFI assets should be predicated on both their financial and functional performance.

The significance of climate change was noted globally, in Europe and in the UK. Also, the size and complexities of various pooled or portfolio-type PPP models for social infrastructure were highlighted. A number of examples in the UK were reported. The next chapter will explain in

detail the wide range of procurement systems available in UK construction, along with typical levels of complexity and risk transferred.

The last section in this chapter established the context for this research study, that of education capital in England. The more prevalent capital programmes during the last two decades were summarised, including the legacy BSF programme.

The BSF policy was explained with the political viewpoints and wider criticism in addition to the Review of Education Capital in various other reports such as ESC, PwC, NAO, PAC, and ICAS. In particular, the DfE Review of Education Capital highlighted a large number of critical lessons, and the lack of learning that was observed in projects in the BSF programme. Another critical point pertaining more specifically to LEPs was that the majority of them were secured by large national and international contractors, thus serving to force local contractors to operate as subcontractors. This was reflective of the way framework agreements in general acted to squeeze out local firms on the basis of size, despite, in many cases, admirable track records of client satisfaction coupled with localised engagement.

The severe criticism about the effectiveness of strategic PPP procurement systems for social infrastructure by the UK's former and current governments and other organisations as described in section 2.5.2.2 gives rise to a need for empirical research. This demand is centred on themes of whole-life VfM performance as well as environmental sustainability of the infrastructure assets produced by temporary strategic PPP organisations. These assets are also expected to contribute to addressing commitments made in the Climate Change Act 2008 for the UK to become a low-carbon economy by 2050.

With this context and background, it is interesting to pose the following two research questions:

- **How do VfM and environmental sustainability considerations impact on the design, build, maintenance and operation of social infrastructure (LEP-built schools)?**

- **How can strategic partnership procurement systems (LEPs) be organised to deliver social infrastructure (schools) when requiring them to be both VfM and environmentally sustainable during the whole asset life?**

On these foundations, the following chapter will build the necessary body of literature and policy for the research. The original BSF policy and the LEP model as the preferred delivery mechanism for school buildings will need to be widely explored to address the various areas of criticism summarised in this chapter. The criticism raised in sections 2.5.2.1 and 2.5.2.2 is related to specific areas of literature in chapter 3 with further detail given to the science domain of organisational learning in chapter 4.

Chapter 3 – Strategic procurement literature

3.1 Overview

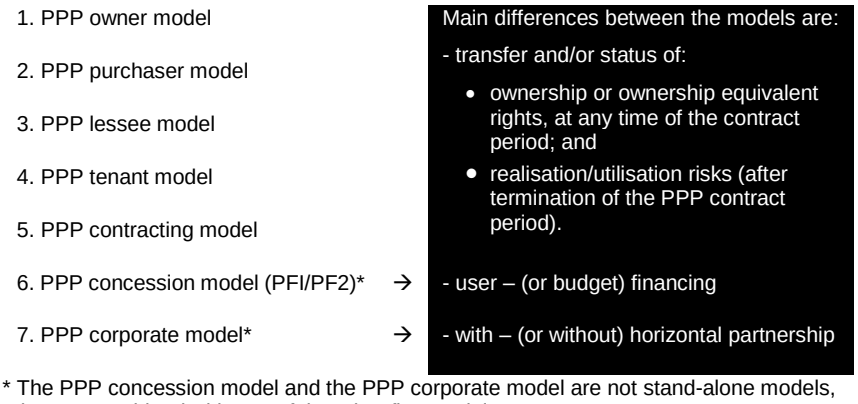
Chapter 3 underpins the key problem definition in section 1.3 (p. 12) from the literature review. The thesis makes a distinction between the theory, policy and practice of strategic partnership procurement for social infrastructure. This is necessary to be able to provide a thorough description of the business environment in which project teams strategically and tactically need to act and learn. Another aspect of the literature review is to develop new ideas, approaches or innovations and to consider whether they are relevant and useful for the research. Several types of sources have been investigated, such as scientific journal papers and books, reports, websites and conference proceedings to debate relevant existing theories and to confirm the state-of-the-art literature.

Chapter 3 explores a wider academic field associated with the research domain (section 1.1), starting with a further review into the body of knowledge in partnering and Value for Money in PPPs (section 3.2) which underpin the mixture of profit and welfare that has been at the heart of public policy for social infrastructure, especially education provision. Second, an overview of risk allocation and delivery of benefits in complex PPP procurement systems (section 3.3). This leads to an exploration of the temporary nature of the project organisations for this type of procurement system (section 3.4), and the ways in which inter-supplier competition (section 3.5) can be encouraged in a long-term partnership while obtaining better performing assets and more Value for Money services. The literatures surrounding these topics were carefully selected to allow a deeper philosophical debate in relation to the primary research domain of organisational learning in chapter 4 and to identify the gap in theory in section 4.10.

3.2 Partnering and VfM in the context of PPPs

3.2.1 Introduction

The various PPP project delivery models encompass a variety of possible relationships between public and private entities for infrastructure development. Each model involves an element of private resources being utilised to provide public services, which in the broadest sense could be used to describe what infrastructure is about (Stewart, 2015). The various forms and definitions of infrastructure were discussed in section 2.3. Public services can range from Maintain and Operate (M&O) contracts in which the facility is completely owned by a public body but is being maintained and operated by a private firm, to Build, Own and Operate (BOO) contracts where the private sector firm builds a public facility, operates it on behalf of the public body, and continues to own the facility in perpetuity. The UK government has identified seven different types of PPP. PFI (now called PF2) is the most common form of PPP in the UK (Li et al., 2005). Figure 3-1 is adopted from Weber and Alfen (2010) and summarises the main types of PPP contracts for social infrastructure assets.



* The PPP concession model and the PPP corporate model are not stand-alone models, but are combined with one of the other five models.

Source: Weber and Alfen (2010)

Figure 3-1: PPP contract models in social infrastructure

This section does not aim to discuss or critically analyse the various PPP models applied in social infrastructure in various countries. Weber and Alfen (2010) highlight that a shared characteristic between all forms is that they are based on a lifecycle approach and hence include the design, build, maintenance and operational phases. A key differentiator pertains to the allocation of ownership during and after the contractual term, and the apportionment of risk pre- and post-construction.

3.2.2 What is a public private partnership?

A PPP is a durable cooperative venture between the public and private sectors built on the expertise of each partner, which best meets clearly defined public needs (Akintoye et al., 2003a; Allan, 2001; Liu et al., 2014; Roehrich et al., 2014). There is nothing new with the involvement of the private sector in the delivery of public services. PPPs in the form of build, operate and transfer were used as early as 1858 for the construction of the Suez Canal (Cartlidge, 2006). In the UK, the metaphor of partnership in the Third Way politics was aimed primarily at eroding the barriers between public and private sectors and promoting the cause of collaborative working (Green, 2011). But the idea of partnership can also be taken to imply the need for collaborative working between management and workforce. Green quotes Collins (2002), who suggests that the purpose of partnerships is: *"to enhance competitiveness, through improvements in quality and efficiency. This purpose requires the exchange of information: management needs to explain its product and marketing plans to the workforce, and the workers need to use their human capital to suggest how production and products can be improved"* (Collins, 2002, pp. 456–459). Green points out that the quote above succeeds in capturing the essence of the Egan improvement agenda as advocated in the construction sector. The headline emphasis on quality and efficiency is immediately suggestive of Rethinking Construction (DETR, 1998), likewise the attempt to mobilise the expertise of the workforce to improve productivity.

In the context of LEPs, LIFT companies and Scottish Hub companies, the required facilities and supporting services are delivered in partnership between the public and private sector.

The boundaries between the two sectors thereby become more blurred, and the risks of private sector involvement more opaque (Shaoul et al., 2013). Notions of public sector clients and private sector contractors become conflated around ideas of LEP/LIFT Companies, Project Companies, and Infra Companies. The ethos of public service may become interspersed with the profit motive. The Third Way was not only unclear in theory, but was also very confused on the ground. Everyone seemingly works in partnership; everyone in the supply chain is encouraged to collaborate. However, the contractors still work as contractors, and the subcontractors still operate as subcontractors. Close collaboration, leanness and agility in the marketplace continued to be the passwords to success in the UK (Green, 2011, pp. 284).

3.2.3 Understanding strategic partnering

The term 'strategic partnering' was frequently used in BSF standard documentation (section 1.2.2) with the LEP being a strategic partnership procurement system, with the SPA as the main long-term contractual obligation between a LEP and a LA. The definitions of both 'partnering' and 'project partnering' will need to be clarified in order to understand what 'strategic partnering' means. Each of them is further analysed below.

3.2.3.1 Partnering

There are many possible definitions of partnering in circulation. Green (1999b) mentions the following definitions as the most comprehensive:

1. "A long term commitment between two or more organisations for the purposes of achieving business objectives by maximising the effectiveness of each participant's resources. This requires changing traditional relationships to a shared culture without regard to organisational boundaries. The relationship is based on trust, dedication to common goals, and on an understanding of each other's individual expectations and values. Expected benefits include improved efficiency and cost effectiveness, increased opportunity for innovations, and the continuous improvement of quality products and services" (Construction Industry Institute, 1989);
2. "Partnering is a management approach used by two or more organisations to achieve specific business objectives by maximising the effectiveness of each participant's resources. The approach is based on mutual objectives, an agreed method of problem resolution, and an active search for continuous measurable improvements" (Bennett and Jayes, 1995, p. 2);
3. "Partnering involves two or more organisations working together to improve through agreeing mutual objectives, devising a way for resolving disputes and committing themselves to continuous improvement, measuring progress and sharing the gains" (DETR, 1998, p. 9).

A few similarities are evident in these definitions. Partnering seems to be primarily concerned with maximising effectiveness. Also, the drive for measurable performance improvement is likely to be key. There is also an emphasis on culture and the aim to ground relations on trust and understanding. Green (1999b) also refers to the Construction Industry Board (1997), who present three essential parts of partnering:

- establishment of agreed and understood mutual objectives;
- methodology for quick and cooperative problem resolution; and
- culture of continuous, measured improvement.

Although there are several similarities across the definitions, it is difficult to find one common quote. However, the assertion from Bennett and Jayes (1998) that the concept of true partnering relies on cooperation and teamwork, openness and honesty, trust, equity and equality is also affirmed in the definitions above. Also the achievement of the appropriate culture is generally of great importance to the success of partnering (Green, 1999b). In this respect, a common worry is the feeling that partnering is a long way from returning tangible benefits to private sector organisations because clients still have a deep-rooted cost-driven agenda (Green, 1999b; Wood and Ellis, 2005). As a result, they expect to reduce costs or to pass costs and risks down the supply chain, and thereby do not genuinely adopt a win-win attitude. Cost and risks in partnering should be apportioned through *"a tough minded recognition by clients that they will get what they need only if consultants, contractors and specialists have a realistic opportunity to do good work and make reasonable profits. It also requires an equally tough minded recognition by consultants, contractors and specialists that they prosper best when clients get excellent value, good buildings or infrastructure and no hassle"* (Bennett and Peace, 2006, pp. 15-16). This is often referred to as a win-win situation, as opposed to the traditional zero-sum assumption that if one person gains, someone else must lose.

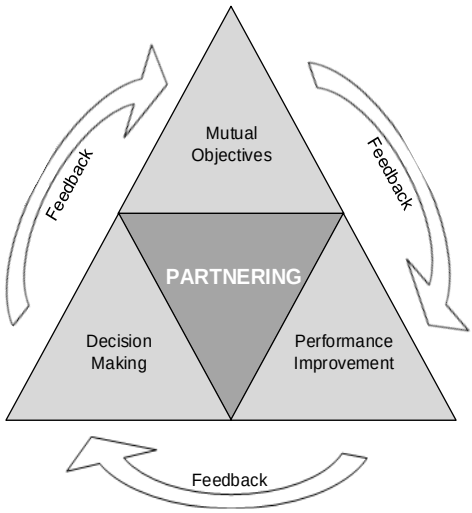
In the context of BSF and LEPs, Green (2011, p. 283) states that *"the culture of enterprise goes hand-in-hand with the culture of audit. The paradox exists on the level of national policy and shapes the improvement agenda in construction. In essence, it is the same paradox which characterises individual partnering initiatives."*

In their article about partnering in construction, Bresnen and Marshall (2000b, p. 235) conclude two major implications: *"'Partnering' is a rather loose term to describe what is in reality a multi-faceted practise"*. They argue that partnering is not always seen as necessary or desirable. Second, they mention that a lot of emphasis has been placed upon exploring interrelationships between formal and informal aspects of partnering (Bresnen and Marshall, 2000a). They conclude that it is much too simple to presume that project team building, the application of tools and techniques, and strong commitment from top management are all that is needed. Bresnen and Marshall (2000b) cite Lewin (1951) and Kotter and Schlesinger (1979), who suggest that implementing partnering may also require a sensitivity to factors that wisely empower particular ways of working, an understanding of the likely impact on individuals' and groups' motivations and interests, and a full appreciation of the complex. Their critical statements serve as a reminder that partnering is not an easy option. It is tough. Also, Bennett and Peace (2006) note that it has to be worked out by everyone involved to achieve the full benefits of partnering. Teams undertaking partnering projects face a task of remarkable complexity and difficulty.

3.2.3.2 Project partnering

Project partnering is a set of actions taken by the work teams that form a project team to help them cooperate in improving their joint performance (Bennett and Peace, 2006). Love et al. (2002) define project partnering as a relationship established for a single project that focuses on short-term benefits, while strategic partnering (a long-term relationship beyond a discrete project) seeks gains for the long-term (section 3.2.3.3).

The specific actions are agreed by and led by the project team taking account of the project's key characteristics, and their own experience and normal performance. The choice of actions is guided by a structured discussion of mutual objectives, decision-making processes, performance improvements and feedback, as in Figure 3-2 below (Bennett and Peace, 2006).



Source: Bennett and Peace (2006)
Figure 3-2: Essential elements of project partnering

Bennett and Peace (2006) explain each of these characteristics as follows: a focus on *mutual objectives* gives clarity to the idea that when people cooperate, they can produce more than doing it on their own to give everyone involved on a collective base what they reasonably want. Again, this win-win attitude is in contrast to the traditional zero-sum assumption that if one person gains, someone else must lose, but it may take time to deal with everyone's concerns (Prisoner's dilemma by Majeski (1984)).

Every partner will have a different view and concern about what constitutes success. The OGC (2003a) came up with six key principles of successful partnering in projects:

1. early involvement of key members of the project team;
2. selection by value, not lowest price;
3. common processes (e.g. shared ICT);
4. commitment to performance measurement as a basis for continuous improvement;
5. long-term relationships in the supply chains; and
6. commercial arrangements based on target cost or target price with shared pain/gain incentivisation.

However, the essential equity of good value for clients and fair profits for private sector organisations provide the platform on which partnering will do well. The following mutual objectives should be considered with all partners:

- value for money;
- guaranteed profits;
- reliable quality;
- fast construction;
- handover to owner on time;
- cost reductions;
- costs within agreed budget;
- operating and maintenance efficiency;
- improved efficiency for users;
- architectural quality;
- a specific technical innovation;
- excellent site facilities;
- safe construction;
- shared risks;
- timely design information;
- shared use of computer systems;
- effective meetings;
- training and decision-making skills; and
- no claims.

For the development of projects by LEPs, most of these issues are integrated within the contracted performance mechanisms as a part of the SPA.

The nature of the LEP's *decision-making* is directly influenced by the members of the work teams drawn from many different firms. They have to agree how decisions will be made. Decision support tools on quality, time and cost are needed to achieve the mutual objectives. The nature of these decision-making systems is directly influenced by whether a client needs the project to produce a standard solution or an original design. An important consequence will be the amount of time that the client and its staff will need to spend on making decisions. The decision-making systems should have robust procedures to ensure that problems are apportioned correctly and resolved quickly in ways that encourage close cooperation.

Partnering that only provides mutual objectives and agreed ways of decision-making may lead to inefficient ways of working. The essential point of partnering is to *improve performance* of the project's work teams. However, it is important that performance improvement in one certain area does not disturb the work team in its delivery of their established normal performance in other areas. When attention is focused on improvements somewhere, the quality can easily drop elsewhere. This is why procedures for partnering should address ways of achieving normal performance as well as delivering performance improvements.

Performance improvement can be encouraged by competition or by benchmarking. However, there is some discussion about the best way to encourage teams to improve their performance. Practical experiences in the construction industry shows that competition can be destructive, where bid prices, quality and safety issues are driven down to lower levels of efficiency. Competition has a role in partnering when it encourages the private sector organisations to invest in training and innovation to improve their own performance. This can even be achieved by providing long-term partnerships between firms (section 3.5.2 will discuss a number of models to maintain competitive forces in partnership). By having two, three or

four options available for key relationships, all the partners are motivated to continuously improve their performance.

Project teams need to guide themselves by *feedback* about their own performance. Achieving performance improvements depends on the teams being able to provide themselves with *up-to-date and objectively measured feedback* on learning points. This could make every partner aware of the partnership's benefits. Teams could measure their own performance and plot the results on control charts that show graphically how they are doing against their targets. Teams believe in feedback they have produced themselves. They use it to search for better ways of working. It should also flow from project to project by a feedback-based system with standards and procedures that help concentrate on efficient work. This is an essential element for strategic partnering. A further discussion about feedback loops is covered in section 4.6.

Smyth and Edkins (2007) conclude that in PPP/PFI projects, private sector management is a reactive rather than proactive role in managing relationships. Their findings do not include direct evidence from the public sector, yet it was clear from private sector evidence concerning the public private interface that there are issues pertaining to the public sector. This evidence indicates that the public sector is particularly weak in consistently managing the interface with the private sector, particularly in ways that engender collaboration through trust. The authors recommend that both public and private sector give greater strategic and tactical consideration to proactive management of relationships to foster collaborative working that goes well beyond behavioural adjustment to new procurement conditions, in essence a shift from relational contracting to relationship management principles.

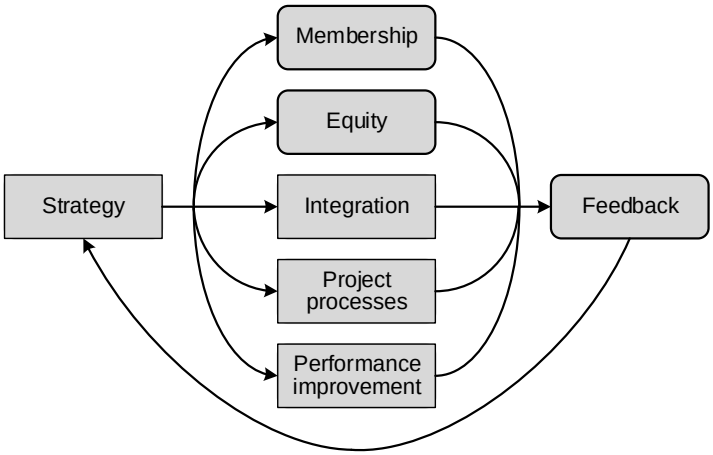
3.2.3.3 Defining strategic partnering

The application of strategic partnering differs compared to project partnering. Cheng et al. (2004) reference Barlow et al. (1997) and Winch (2000), who point out that the latter (project partnering) targets the achievement of partnering goals and project performance, while the former (strategic partnering) opens the scope for continuity of the reciprocity between involved parties. The authors therefore suggest that strategic partnering should be considered as process-oriented, and project partnering as result-oriented.

The Construction Industry Institute (1991) define strategic partnering as a long-term cooperation between two or more organisations committed to achieving specific business objectives by maximising the effectiveness of each participant's resources. According to Bennett and Peace (2006), strategic partnering means firms supporting project teams in partnering over a series of projects. The organisations accept that cooperative teamwork is more effective and efficient than competition. It works because the parties involved have an interest in each other's success. Strategic partnering is based on the most fundamental reason for people to cooperate. This is not just that they trust each other; it is because they expect to work together again in the future. Bennett and Peace (2006) emphasise that this cooperative behaviour is entirely natural for people who expect to continue to interact for the long term.

When they no longer expect to interact again, they will start to look after their own interests again. It is safe to trust people to behave in that fundamentally human way.

Strategic partnering develops over repeated interactions between firms as the people they employ learn how to cooperate and improve cooperation. It usually develops as an extension of a single or initial project partnering. The set of actions from the definition are taken by the people involved. They are guided by an agreed strategy and they use feedback loops to ensure that they will continually improve their performance. Bennett and Peace (2006) came up with a set of actions found in best practice, derived from the Reading Construction Forum (1998) as shown in Figure 3-3. The actions aim to agree an overall strategy; ensure the right firms are included and financial arrangements support partnering; firms' cultures, processes and systems are integrated; the most effective project processes are used; measured performance continuously improves; and the whole arrangement is guided by feedback.



Source: Bennett and Peace (2006)

Figure 3-3: The seven pillars of partnering

The OGC state that strategic partnering involves the integrated supply team and the client organisation working together on a series of construction projects to promote continuous improvement (OGC, 2003a). According to the OGC, *"long-term collaborative relationships (strategic partnering) can promote better value for money by encouraging clients and suppliers to work together as an integrated project team"* (OGC, 2003a, p. 5). Partnership arrangements may take the form of charters or non-binding statements. The latter is the most usual form seen on individual PFI projects. The National Audit Office also recommends adopting a partnership approach to PFI projects based on a common vision of how parties will work together to achieve a mutually successful outcome (NAO, 2001). In a PFI context, partnering is also used to bundle small projects which cannot be tendered cost-effectively as individual PFIs. Since the 2000s, PFI has increasingly been seen as a facilitator for projects. This has also been the case for those which initially have no PFI element (Roe and Jenkins, 2003). In the public sector, it has become apparent that PFI is not a universal solution to all complex situations (refer to section 3.3 on complex procurement systems). According to Roe and

Jenkins, since the early 2000s, in many cases the intention was to use PFI increasingly in a standardised way.

A major implication according to Bresnen and Marshall (2000a) is that collaborative approaches do not necessarily remove conflicts at source. Collaborative teams may need to conquer a number of practical barriers, including difficulties in providing continuity of work and overcoming feelings about long-term relationships being too 'cosy' and consequently less competitive (Bresnen and Marshall, 2000a).

Love et al. (2002, p. 5) suggest, referring to Morrison and Mezentseff (1997), that *"a learning alliance is crucial to a cooperative environment where learning is encouraged and reflective in nature and through which participating parties will strive together to meet the objectives of the relationships"*. So they argue that it is important to evolve and learn while working in close cooperation. They also cite Mintzberg et al. (1996), suggesting that within some cooperative relations, partners may begin to lose their competitiveness and vision once they become dependent on the capabilities of other parties. In BSF projects, the continuous improvement targets were designed to deal with some of these issues.

Regarding the cooperative arrangements, Love et al. (2002) cite Mintzberg et al. (1996), who suggest that partners may begin to lose their competitiveness and vision once they become dependent on the capabilities of other parties. If this occurs in the relationship, the less reliant and more sufficient partner may become a threat to their alliance partner(s) by becoming a direct and powerful competitor. To avoid this, its structure should include a learning framework that enables alliance partners to openly reflect their knowledge and information while retaining the visions for the alliance as well as their individual organisation. Morrison and Mezentseff (1997) suggest integrating this mechanism into the relationship to allow all parties to benefit from the shared knowledge. The sharing of knowledge may stimulate learning, which is considered to be a fundamental ingredient for continuous improvement within strategic alliances (Bronder and Pritzl, 1992).

3.2.4 Understanding best value for money in PPPs

The term best VfM was frequently used in BSF standard documentation (section 1.2.2). In order to define best VfM, the term can be divided into 'value', 'best value', 'VfM' and 'best VfM'. Each of them is further analysed below. In addition, an in-depth review of the term 'value enhancement' is provided in section 3.2.5 on page 61. Furthermore, this section is based on the Be Valuable report (Saxon, 2005) and research by Akintoye et al. (2003b) about achieving best value in PFI project procurement. Arguments are also provided by analysing other reports and research articles on related subjects.

3.2.4.1 Value

Value is a much-used word. The UK government seeks to buy 'best value' and 'VfM' but for other parties it may have a slightly different meaning. Also, the interpretation of value by the government is very different now compared to the 1960s, where schools and social housing were poorly built to minimise capital cost. This era of 'cost' in the UK property and construction industry has recently changed. Government thinking changed once the idea of private finance emerged in the early 1990s. The private sector became sensitive to *performance enhancement* and the public sector became aware of lifetime costs. The exchange of experience through PPPs and the sustainability debate has led both sides of the market towards awareness of building performance as a whole: *"what an appropriate building can do for occupier and investor performance and what it really costs to deliver managed space in a publicly acceptable way"* (Saxon, 2005, p. 3).

Value is a personal matter, not an objective fact. What we value stems from what values we hold and from what we choose to value. Our values are formed from our society's commonly held views but also from our position as a member of that society and as a player in the transaction being valued. This subjectivity of value is a key point in discussing how to understand and use the concept of value. It implies that to state the value of anything, we have to know who is judging, and, in a situation with multiple stakeholders, what will determine the balance of view. In the built environment, matters are highly diverse in their pattern of stakeholders, with many situations offering different value to each party (Saxon, 2005). The 'Be nCRISP Value Task Group' led by Saxon attempted to explain the notion of value as represented in a simple equation in Figure 3-4 below:

Source: Saxon (2005, p. 7)

Figure 3-4: The value equation

This equation illustrates that positive value exists for any player when they get more in their own terms than they must give up. Negative value exists when sacrifices exceed benefits. In other words, a positive balance creates value and a negative balance destroys it. In most definitions, the word 'value' is deemed to be preceded by the adjective 'positive'. The Be Valuable report defines 'value' as follows: *"The balance of benefits and sacrifices involved in a judgement of worth; hence positive and negative value; creation and destruction of value"* (Saxon, 2005, p. 10). Morris (2013, p. 83) defines value in the context of projects as *"the quotient of function/cost or quality/cost, performance/resources or similar. The aim is to analyse, in a structured manner using a wide selection of different stakeholders, the project's requirements and ways of addressing these more effectively – by getting more for less."*

Green (2011), however, is critical about the position by Saxon (2005) regarding value definition. He points out that Saxon failed to mention the extensive debate about 'value' which

happened among building economists in the 1960s and 1970s (Hutton and Devonald, 1973; Stone, 1983; Turin, 1966). These authors give extensive attention to the 'use value' of buildings and the extent to which it could be optimised. Green (2011, p. 338) critiques Saxon's (2005) concept of *"a value-oriented built environment industry being directly reflective of New Labour ideology which prevailed at the time"*. Besides, Morris (2013) also pointed out that the trouble with value is that it is a notoriously vague term, not merely subjective in much of its assessment but even having several quite different meanings.

3.2.4.2 Best value

> ***"Best value is a relative notion, which refers to the optimum outcome of a business process. It is applicable to all industries, sectors, geographic locations and cultures. Best value is expected to help organisations improve their performance"***
> (Akintoye et al., 2003b, p. 462).

In 1997, the UK Labour government introduced the best value requirement in order to redefine the primary objectives of public sector organisations in relation to efficiency and quality of public services. As it requires a cultural change, the adoption of a best value regime is a gradual, long-term process, the success of which depends on a number of aspects, such as:

- the ability to adopt a critical attitude and to identify problem areas;
- accessing and acquisition of advanced knowledge for cost-effective solutions;
- the establishment of proper lines of communication;
- sharing knowledge internally and externally; and
- setting new targets.

Akintoye et al. (2003a) argue that despite government guidance, best value has remained difficult to define. It seems that the term is useful more in relation to public sector organisations. The Be Valuable report defines best value as: *"The optimum mix of benefits and sacrifices involved in the view of the decision maker. This may range from the lowest whole-life costs achievable for a standard benefit package to the most benefits available for the resources allocated"* (Saxon, 2005, p. 10*).*

According to DETR (1999), there are four key principles to facilitate the implementation of best value: 1) accountability; 2) transparency; 3) continuous improvement; and 4) ownership. The Local Government Act (1999) imposed the duty of best value on LAs in England and Wales.

A Best Value Task Force was set up in Scotland in May 1997 to develop the essential elements of best value, and long-term arrangements for achieving it. They produced three reports in which they identified the foundations of best value. Their first report (July 1997) identified the main principles and elements of best value. It emphasised partnership, operation with minimum prescription, building on good experience, and avoiding new bureaucracy. The second report (July 1998) developed a best value system, called the Performance Management and Planning Framework. The last report (March 1999) was a consultation paper

for long-term arrangements for further development of best value as a framework approach. Akintoye et al. (2003b) mention that the developed best value approach emphasises efficiency, VfM, and exact quantitative performance standards. It requires new ways of partnerships with private sector organisations. It also requires public sector organisations to serve the public in the best possible way in all aspects of service provision.

3.2.4.3 Value for money

> ***"Value for money is the optimum combination of whole-life costs and quality (i.e. fitness for purpose) to meet the user requirement"*** (OGC, 2003b, p. 2).

The Be Valuable report argues that the definition of VfM has a similar meaning to their definition of best value, but implying that only money values are significant. The HM Treasury clearly connects best value and VfM with PFI in a number of early reports: Meeting the Investment Challenge (HM Treasury, 2003), Value for Money Assessment Guidance (HM Treasury, 2004b) and PFI: Strengthening Long-term Partnerships (HM Treasury, 2006a).

Asenova et al. (2002), who cite Arthur (1999), explain that best value is often understood as a part of the obligation of LAs to ensure VfM. However, it is primarily intended to guide the activities of LAs, while in the early 2000s PFI was seen as the UK government's preferred procurement strategy, which in practice may or may not be compatible with VfM or best value requirements. VfM considerations at contract selection will be covered in more detail in sections 3.3.3 to 3.3.5.

In the early 2000s, the UK government emphasised that PFI would be used where it offered VfM. In order to demonstrate this, HM Treasury published a Value for Money Assessment Guidance in 2004. HM Treasury recommend not pursuing PFI where it was not found to be likely to generate positive VfM, as was the case for ICT projects and projects with a capital value below £20m (HM Treasury, 2006b). However, internationally the appraisal of VfM for a PPP/PFI project was an area that needed continuous engagements between the practitioners and academics on the issues involved (Grimsey and Lewis, 2005). To achieve positive VfM in a PFI project, it is important for both public and private sector partners that the project company will be measured through KPIs and to ensure that testing is done on market feasibility. VfM measurement and assessment is used to ensure that a particular project will achieve best value (Akintoye et al., 2003b). Therefore, the project needs to be placed in a competitive market, the proposed procurement process has to keep transaction costs to a minimum, and a realistic procurement timetable needs to be feasible and maintained. Assessment takes place on the level of the investment programme, the procurement level and the project level (HM Treasury, 2004b). It is also important to ensure that during the procurement process, there is no market failure or abuse that jeopardises VfM (HM Treasury, 2004b). Detail about the measurement and assessment of VfM is discussed in section 3.3.3, with further background in the context of BSF LEPs in section 2.4 of **Appendix C2** and **Appendix G1**.

3.2.4.4 Defining best value for money

The term best VfM was frequently used in the context of BSF and its LEP standard documentation. However, the term itself was not clearly defined in any of the contracts. Also, the UK government used the term in their PFI: Strengthening Long-term Partnerships report (HM Treasury, 2006a).

The government uses a range of procurement structures for complex investment projects like BSF. Which route is chosen depends on which structure will offer best VfM given the particular characteristics of a project (HM Treasury, 2006a, p. 27). Apart from BSF, the term seems to have a degree of self-interpretation and as a consequence it may become a loose and vague term. Brady et al. (2005a, p. 577) state that *"the construction industry had insufficient understanding of value whether in terms of cost, quality or whole-life value"*. This statement implies there is no consensus about what value is, not to mention how to measure and assess it. However, it seems there can be a positive, negative and optimum (or best) VfM.

The OGC define VfM as *"the optimum combination of whole-life costs and quality (i.e. fitness for purpose) to meet the user's requirement"* (OGC, 2003b, p. 2). According to this statement, it appears that the definition refers to the user's requirement. In BSF, however, the LA was mainly representative for the end-user, and they should come up with requirements of what represents best VfM. Based on this consideration, the private sector organisations are instructed with what they are required to do to in order to meet the best value criteria. On the other hand, the private sector can also take the lead in shaping project solutions based on their expertise.

A major implication can be that the participants involved in LEPs might not have a common understanding due to a lack of know-how. Akintoye et al. (2003b) suggest one possibility for the public sector to capture the existing PFI know-how is to set up a team that will move from one project to the next. It seems that the BSF programme was designed to address some of these problems, as the LEP established a pipeline of schools during a 10 to 15 year exclusivity period. Besides, Brady et al. (2005a, p. 579) cite in their research about integrated business solutions that: *"future research should aim to take a longitudinal approach in order to create opportunities for adequate feedback loops between different stages in the design-build-operate process".* This implies that understanding can also improve within the life of a project.

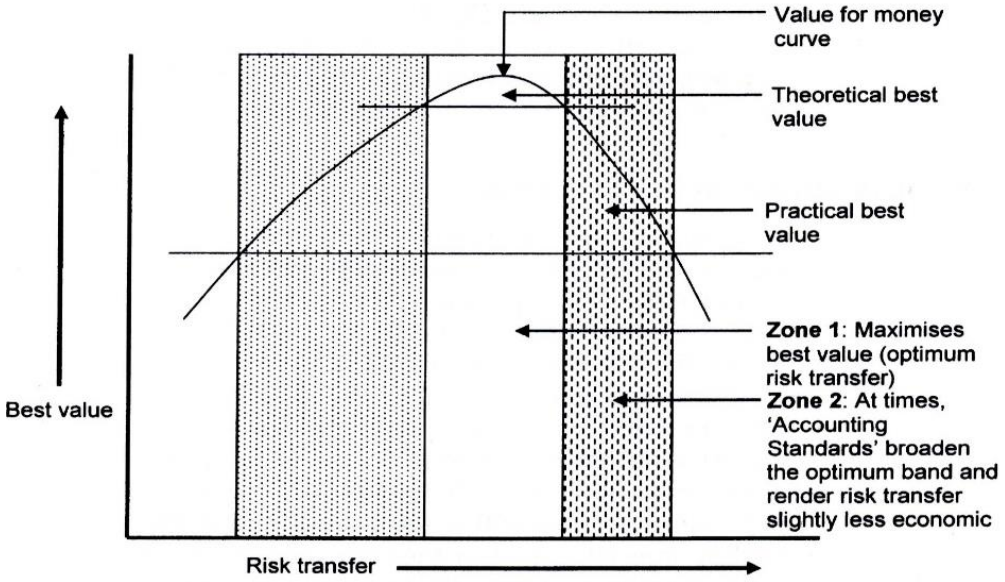
Brady et al. (2005a) suggest that the best opportunity for the introduction of a solution is in the context of PFI in the public sector or large clients who require repeatable solutions in the private sector. PFI contracts are now very largely standardised. In LEPs, however, there is a mixture of PFI and more conventional procurement routes. Parties involved in PFI and non-PFI should continually bear in mind the correct adoption of best practice and be aware of how to apply VfM tests and tools. Ball et al. (2003, p. 289) conclude that *"there is some indication that if things go well that the private sector will benefit, but if things turn out badly then the public sector client finds it hard to exact the penalty regime that was laid down"*. Continued

monitoring and performance measurement of current projects may help to find out more about this. However, the OGC argue that tools to create VfM still needed to be implemented through a number of methods. Projects within the BSF programme were provided with these tools (OGC, 2004) as shown in Table 4 in **Appendix C**, section 2.7.

All parties of PFI sectors indicate, with the implication as discussed above, that inadequate risk management has a diminishing impact on best value (Akintoye et al., 2003b). Risk management could demonstrate considerable advantages for both the public and private sector partners, if conducted adequately in the PFI process in view of the best value expectations. Improvements are suggested in dealing with risk management, such as staff training, increased risk awareness, development of databases of historic statistical data, performance measurement and benchmarking. Akintoye et al. (2003b) conclude in their research that the majority of the public and private sector respondents believe that PFI processes have to be further standardised, in order to reduce time delays, professional fees and costs involved. In addition, Akintoye et al. (2003b) list the following barriers in the optimal attainment of best value in PFI:

- inadequate risk management in the PFI process;
- the cost of PFI procurement is high;
- the negotiations are lengthy and complex;
- there is difficulty in specifying the quality of a service compared to specifying a tangible asset;
- pricing the FM services in a vacuum during the bidding stage;
- there are potential conflicts of interest. These could arise between different participants as they are looking at the scheme from different perspectives; and
- clients are unable to manage PFI projects properly, especially the consultants.

In terms of best value in relation to money values, the curve in Figure 3-5 shows that an optimum VfM can be reached depending on the amount of risks being transferred by the decision makers.



Source: Akintoye et al. (2003a)

Figure 3-5: The balance between best value and risk transfer

The public and private sector negotiate with each other for several months to sort out the ownership of risks. The negotiations continue until all risks have been priced and allocated to one of the parties. In their book, Akintoye et al. (2003a) illustrate the quest of risk transfer by means of maximising VfM, as shown in Figure 3-5. This research has a focus on the contracted performance aspects. An investigation of risk aspects would be a subject for future research.

3.2.5 Value enhancement in PPPs

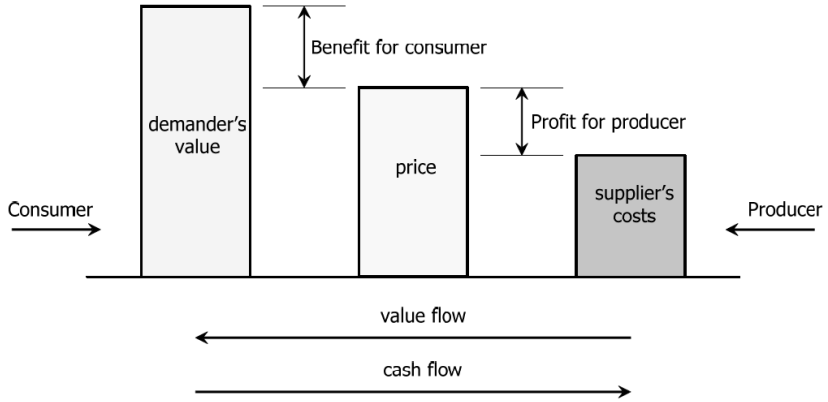
From a public sector client perspective, value enhancement seems to be rooted in Saxon's concept of a value-oriented built environment industry. Saxon (2005, p. 12) captures the essence of the shift which has taken place: *"customers in the great majority of cases do not seek to buy construction per se; they seek the use of facilities or the creation of assets. They find value in the availability of service space, developed and run to support their business or social service".* Winch (2012) points out that the construction of a new building is about the creation of new value in society, including the creation of an asset that can be exploited. Spencer and Winch (2002, p. 3) stress that: *"it is vital that [investments in built assets] are not only cost-effective to construct, but also enhance the efficiency and effectiveness of the organisations that use them for their own activities, be they profit generation, public good or private pleasure"*.

From a private equity investor's perspective, Weber and Alfen (2010) point out that investors in greenfield projects do not generally turn a profit on their investments in the first years of the development and construction phase, but instead are merely required to make payments. There is only a return on investment when the respective facility is in operation (making for a J-curve which is typical for cash flows from private equity investors). Investors accept this J-curve and the higher risks associated with greenfield (new build) compared to brownfield (retained estate) investments because the growth potential of an asset is at its highest in the start-up phase; therefore, they can participate in the value enhancement of projects in this phase and possibly generate higher returns as a result. Conservative brownfield projects in good condition ideally offer stable, long-term predictable cash flows from the start through dividends or interest payments. However, the profile of brownfield assets that are in poor condition, for example due to their age, poor maintenance, weak management, heavy usage and/or financial distress due to, for example, high leverage or no long-term contracts, may be quite high and the return/cash flow profile very unpredictable and unstable. In such case, value enhancement should be delivered through, for example, operational improvements, repairs and capacity expansions, new forms of use, or financial and/or contractual renegotiations and restructuring (Weber and Alfen, 2010).

Spencer and Winch (2002) observe that central to any investment decision-making process is the trade-off between the expected return in the form of an income stream and other benefits, and the capital investment required to realise those benefits. While for the private sector the

main benefit from investment is to provide financial return in the form of profitability or NPV, in the public sector the return is often generated through social or environmental benefit, set off against the total capital costs expended to provide a measure of its cost-effectiveness.

Scholars have tried to address the issue where public and private sector have mutual interest when it comes to value creation and value enhancement. The performance of a building can be described by value at one side and cost at the other side (Bunge, 2006). De Ridder and Vrijhoef (2008) refer to origins of this principle in TQM and continuous improvement, which emphasise the creation of more value against less cost. De Ridder and Vrijhoef (2008) cite Porter and Van der Linde (1995); Vollmann (1996), who point out that this separation of value at one side and costs on the other side models the normal perception of goods in daily life. Consumers are interested in value for money and producers are interested in money for value. Both parties are interested in good performance, which De Ridder and Vrijhoef (2008) define as the difference in price when value and costs of the built asset are compared. When that difference is big enough, both parties can easily find a price which is beneficial for each by dividing the price difference. In this way, the total performance is divided in two partial performances: (1) the benefit for the consumer which is defined as value minus price and (2) the profit for the producer which is defined as the price minus the costs (Figure 3-6).



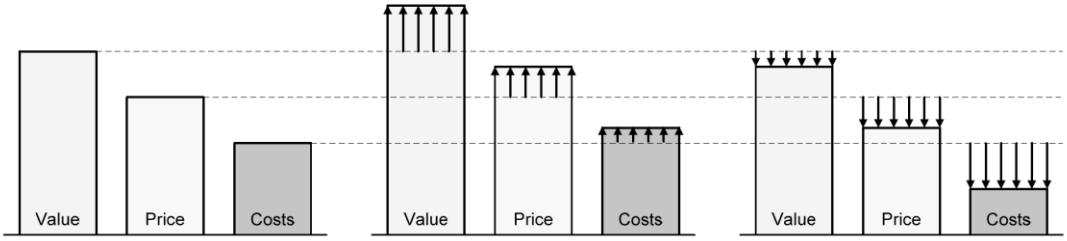
Source: De Ridder and Vrijhoef (2008, p. 1167)

Figure 3-6: Value price cost model combining consumer's benefit and producer's profit

Based on these principles of value, De Ridder and Vrijhoef (2008) introduced the Living Building Concept, which requires continuous intervention that is dynamically controlled, with added and extracted value on one side and investments and savings on the other side. This requires a systematic approach for the prediction of the performance in value and costs of the system in changing conditions. The Living Building Concept aims to keep built objects fit for purpose and up to date continuously by applying new technologies and insights for improved performance and sustainability. The strategy implies an integrated approach to the procurement, delivery and maintenance of built objects.

De Ridder and Vrijhoef (2008) argue that in contrast to the traditional construction industry where value and price of buildings are fixed at the early start of a construction project, the

Living Building Concept considers value, price and cost as moving variables. In this approach, buildings and structures remain fit for use and up to date with state-of-the-art technology under fast-changing circumstances. This dynamic control is sketched in Figure 3-7 below:



Source: De Ridder and Vrijhoef (2008, p. 1169)

Figure 3-7: Dynamic control of buildings

In essence, the dynamic control is that both consumers (e.g. public clients) and producers (e.g. private partners) either strive for substantial value enhancement against little extra costs or accept a little less value for a substantial reduction of costs. Both strategies are beneficial for the two involved parties. The transaction model can also be used to determine the value and costs for a portfolio of buildings. In an ideal situation, all built assets generate value for consumers (clients, users, owners). They pay a price for 'consuming' this value, which results in overall revenue. The set of producers (e.g. contractors and investors) gain profit which is the difference between the total revenue and the total costs.

3.2.6 Summary of partnering and best VfM in PPPs

A long-term partnership enables the partners involved to carry out projects effectively by acting and thinking long term. In BSF, a LEP entered into a long-term SPA with a LA client. Strategic partnering means firms supporting project teams in collaborating over a series of projects and exist when two or more organisations develop a close, long-term relationship based on working together to enable them all to secure the greatest benefits. Strategic partnering is one form of long-term partnership. Other forms of long-term partnership in construction are project partnering or partnering (without projects).

The term best VfM consists of a combination of best value and VfM, whereby best value is defined as the optimum mix of benefits and sacrifices involved in the view of the decision maker. In the context of BSF and LEPs, the notion of best VfM seems to demand a more integrated solution due to the phenomenon of enabling different procurement routes and having a portfolio of projects. Most of the construction literature links best value or VfM with the PPP/PFI procurement route only. In such case, the functional value enhancement of infrastructure assets should be of primary concern to both the public and private sector.

It appears that both terms have a strong link with performance and in particular performance improvement. Best value and VfM are expected to help organisations improve their performance, and the whole point of partnering is to improve performance of the project teams.

Many school buildings and social housing properties built in the 1960s were poorly constructed to minimise capital cost, and then neglected for maintenance (a policy called 'deferred repairs') in order to meet short-term pressures such as teacher salary increases. With a PFI school, unitary payments service the capital (both equity and debt) and fund the operation and maintenance, including component replacement, making all these costs very visible. Value can now be seen, in cost terms at least, to involve the operating cost as well as the capital and its financing cost. Consequently, the private sector becomes sensitive to performance enhancement and the public sector becomes aware of lifetime costs. Crossover of experience through PPPs and the environmental sustainability debate has led both sides of the market towards awareness of building performance. In short: what an appropriate building can do for both occupier and investor performance and what it really costs to deliver managed space in a publicly acceptable way.

Key messages:

- Definitions of value and partnering can easily be confused and interpreted to suit different public and private sector organisations. Hence, the definitions in this chapter are defined relative to the topic of this research study.
- In PPPs, there is a possibility that boundaries between the two sectors become more blurred, and the risks of private sector involvement more opaque.
- Questions should be raised about whether close working in a strategic partnering structure improves productivity. Or is it the case that contractors continue to work as contractors, and the subcontractors still operate as subcontractors.
- A collective understanding of best VfM between public and private sector can encourage delivery of a better combination of WLC and quality (i.e. fitness for purpose) to meet the user's requirement.
- Questions should be asked about if it is possible for investments to not only be cost-effective to build, but also enhance operational efficiency and effectiveness for the end users. Do investors simply view value enhancement opportunities as strategies to maximise returns, or is there a common ground?
- The Living Building Concept is a model where both consumers (e.g. public clients) and producers (e.g. private partners) either strive for substantial value enhancement for little extra cost or accept a little less value for a substantial reduction of costs.

Having explored the body of knowledge of Best Value for Money and Strategic Partnering in the context of PPP, the next section will attempt to further identify key characteristics of risks and benefits associated with complex PPP procurement.

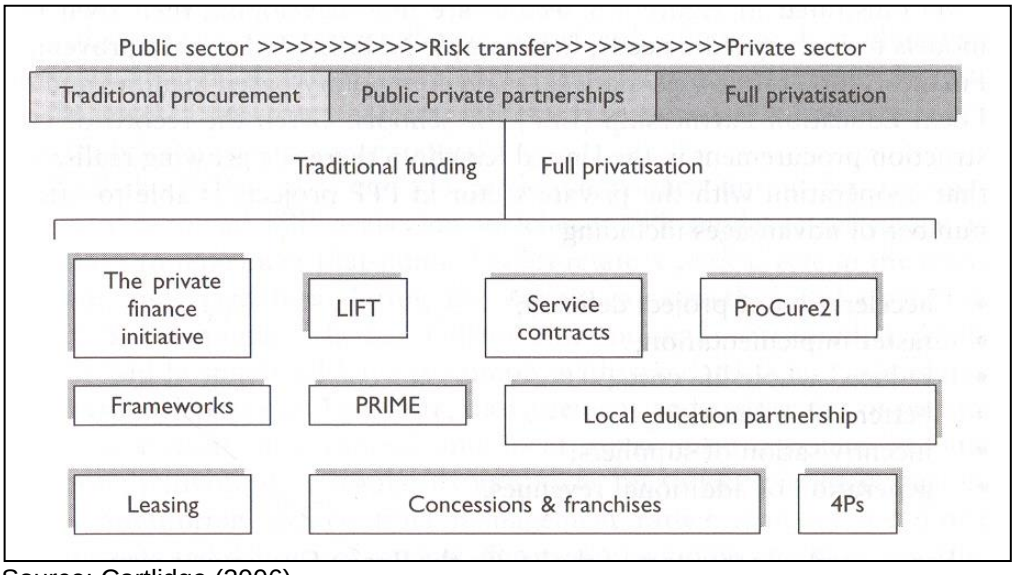
3.3 Complex procurement systems: risks and benefits

3.3.1 Introduction

This research focuses on the contractual aspects in strategic PPP/PFI procurement systems in relation to delivering functional performance of the assets they create. This was introduced briefly in section 1.1. Investigating risks and benefits (apportionment, mitigation, transfer and management) associated with complex PPP procurement covers a wide domain of literature. Both benefits and risks carry a strong relation to fundamental aspects of *project finance*, *risk transfer, inter-supplier competition, projects as temporary organisations, partnering and VfM*. Hence, issues discussed in the subsections below are not viewed in isolation but inherently linked to the subsequent sections in this chapter.

3.3.2 An overview of complex procurement systems in UK construction

Innovation in construction procurement started to emerge at scale in the early 2000s. This followed the appeal for radical change and innovation in UK construction in high-profile reports by DETR (1998) and the Strategic Forum for Construction (2002). The context and background to PPP was explained in section 2.3.2. The whole concept of PPP is underpinned by a public sector desire to resolve financial constraints in the provision of public facilities and services by calling upon private sector skills to increase the efficiency, effectiveness and quality of facilities and services delivery. Li et al. (2005, p. 459) note that the three most important critical success factors in any PPP are “a strong and good private consortium”, “appropriate risk allocation” and “available financial market”. Levels of private sector involvement can range from simple service provision without recourse to public facilities, through service provision based on public facilities usage, up to and including full private ownership of public facilities and operation of their associated services. Figure 3-8 below by Cartlidge (2006) displays a range of PPPs across this risk spectrum in the UK.



Source: Cartlidge (2006)

Figure 3-8: Level of risk transfer for each procurement option in the UK

Some of the PPP procurement models in Figure 3-8 are strategic partnerships as introduced in section 2.4 (e.g. LIFT or LEP) with further detail in **Appendix C**. These have characteristics of both a horizontal (contractual) and vertical (institutional) partnership. This blended structure adds to the complexity from multiple angles: contractual, policy, governance, accounting, and relationships. While each of the alternative models in Figure 3-8 have their own set of circumstances, they all are classified as PPPs. However, what makes one form of PPP more complex than the other? HM Treasury investigated this as they are often engaged by procuring authorities who need their advice when considering which procurement option to select.

3.3.3 Appraising procurement options

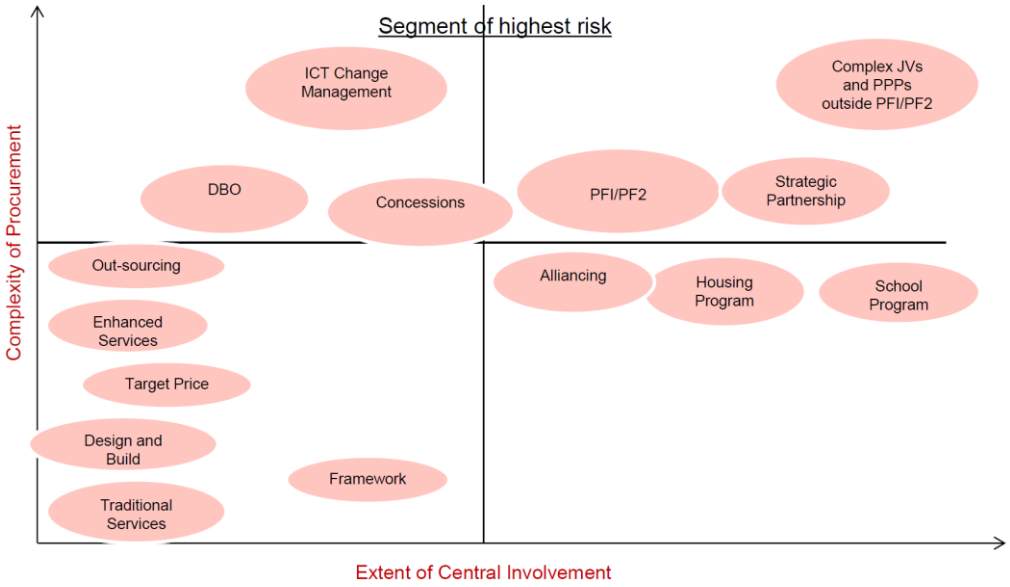
Figure 3-8 above demonstrates that UK PPPs cover multiple types of partnerships and service delivery in which various sectors develop their own PPP models to meet specific requirements. The UK government has identified eight types of PPPs (HM Treasury, 2000):

(1) Asset sales: the sales of surplus public sector assets.
(2) Wider market: the skills and finance of the private sector to help with better use of public assets.
(3) Sales of business: the sales of shares in state-owned businesses by flotation or trade sale.
(4) Partnership companies: introducing private sector ownership into state-owned business, while still preserving public interest through legislation, regulations, etc.
(5) Private Finance Initiative (PFI, now Private Finance 2 or PF2).
(6) Joint ventures, in which partners pool their assets and resources together under joint management.
(7) Partnership investments, in which the public sector contributes to the funding of investment by private sector parties, to ensure that the public sector shares in the return generated.
(8) Policy partnerships, in which private sector individuals, or parties, are involved in the development, or implementation, of public sector policy.

In a presentation by Infrastructure UK (HM Treasury, 2013) for the OECD in 2013, about the UK experience and lessons learned in achieving VfM in PPP projects, the options appraisal approach for selecting the optimal procurement route for a project was explained:

- It is vitally important to consider *all feasible options* for delivering a project at the start of the development process, in order to choose the right contracting model.
- Sometimes projects have simply looked at a PFI approach against a traditional public sector approach (i.e. only two options).
- Private finance is only one of a range of possibilities. The option tests should be transparent about any constraints or assumptions (since these are often unsaid and can skew the analysis).
- All options should be tested by comparing net present costs against net present benefits (on a discounted basis).
- Accurate data across programmes (to input to models) is vital.

Figure 3-9 below by HM Treasury (2013) displays the wide range of UK procurement models, plotted by complexity on the vertical axis against the extent of central government involvement (i.e. transfer of risk).



Source: HM Treasury (2013)

Figure 3-9: HM Treasury range of available procurement models

All the forms of procurement that this research concerns (i.e. PFI, strategic partnerships and complex joint ventures and PPPs) are displayed in the top-right quadrant: these forms have the highest complexity and high levels of involvement, often via central government departments or non-departmental government delivery bodies such as EFA or CHP. As such it is pertinent that the benefits and cost of procurement options are appraised carefully before embarking on any form of complex procurement, and therefore by definition an ex-ante assessment.

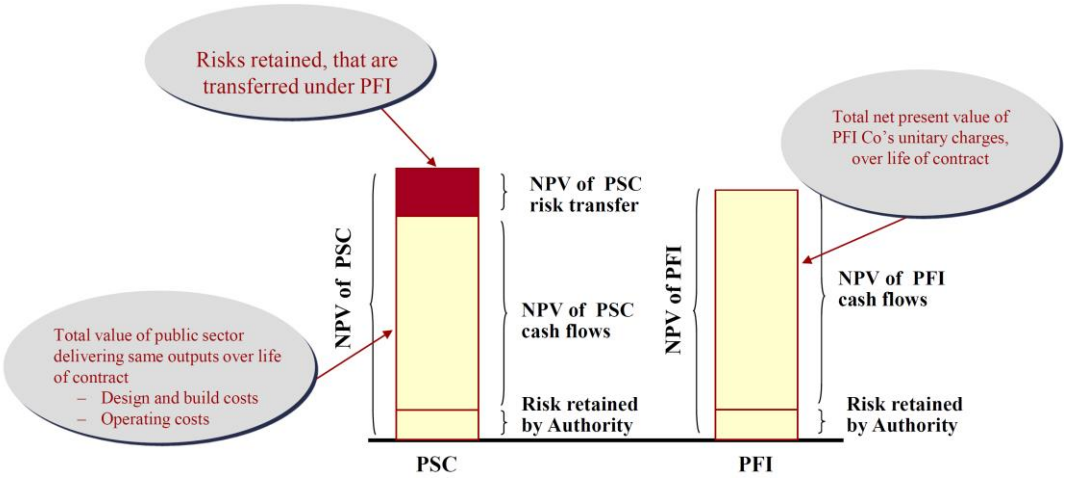
The first test involves a cost/benefit analysis of the different options to take a project forward. The second part pertains to a qualitative and quantitative test for private finance; the latter is also known as the Public Sector Comparator (PSC). The qualitative test of the suitability of using private finance is typically on: (1) viability, (2) desirability and (3) achievability:

- contractual fixed price (fixed price has a value to public sector);
- long-term predictable need;
- long-term solution (WLC);
- stable policy framework;
- private sector can manage risks and be responsible for delivery;
- performance-related payment;
- effective risk allocation (placed with party best able to manage it);
- private capital at risk;
- big enough to justify procurement costs;
- competitive bidding market; and
- public sector governance and quality assurance (skilled teams).

It also tests the unsuitability of projects, for example:

- project or service likely to undergo significant change;
- demand/solution not inherently long term;
- risk of obsolescence;
- too small;
- too complicated; and
- procuring authority inadequately skilled.

The quantitative test is a numerically based model that quantifies risks and compares risk-adjusted costs of a project, as explained in Figure 3-10 by HM Treasury (2013) below:



Source: HM Treasury (2013)

Figure 3-10: Typical profile of Net Present Value of PSC vs PFI

In the UK, too much emphasis has been given to the quantitative analysis (as if it provided mathematical proof of VfM) and too little to qualitative considerations. Infrastructure UK (now Infrastructure and Projects Authority or IPA) are looking to correct this balance. Another aspect is that the PSC is reliant on a single-point, cost-based test based on NPV and needs empirical data and sector experience, which may be limited at the start of a programme.

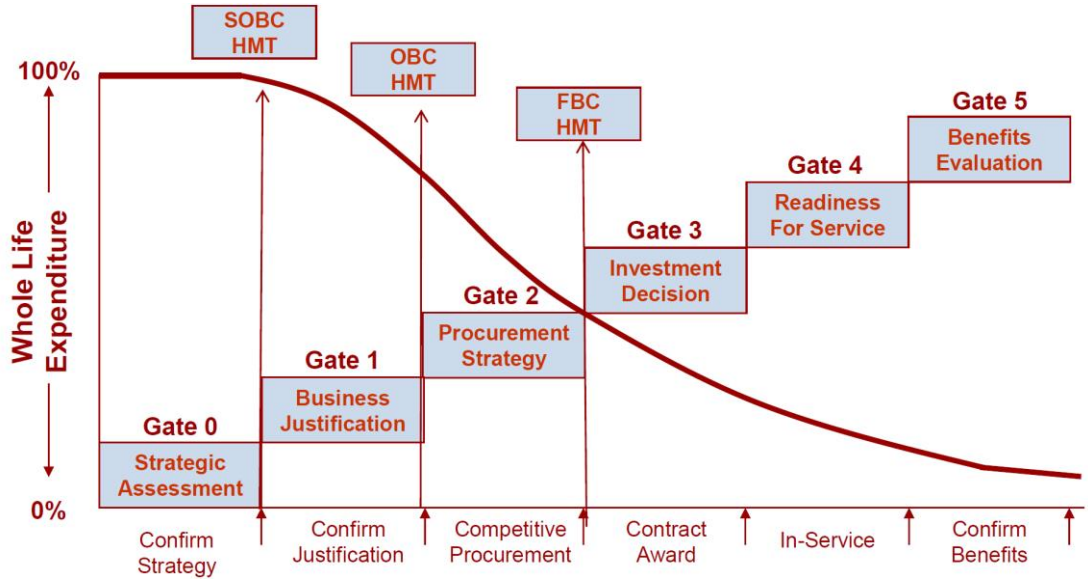
HM Treasury published guidance on VfM assessment for investment proposals to be procured under PFI and on VfM in the refinancing of PFI projects (HM Treasury, 2006b). To achieve VfM in a PFI project, it is important to ensure that testing is done on market feasibility. The project needs to be placed in a competitive market, the proposed procurement process has to keep transaction costs to a minimum, and a realistic and quick procurement timetable needs to be feasible and maintained. It is also important to ensure that during the procurement process, there is no market failure or abuse that jeopardises VfM (HM Treasury, 2004b).

3.3.4 Evaluating benefits in PPP/PFI

Benefits from realisation management is an aspect of project management that has received increasing attention in the past few years, especially in methods of procurement involving PPP/PFI (Breese, 2012; Breese et al., 2015; Morris, 2013). Morris (2013) highlights two conceptual benefits to project management: 1) a greater emphasis on WLCs, on operating efficiency, and on benefits and effectiveness, and 2) the development of project companies as deliverers of services (as opposed to products) comparable to ICT and FM services. The management and realisation of benefits is also a major subject in programme management (Sanchez and Robert, 2010).

Breese (2012) cites Morris et al. (2012), who note that benefits realisation management is closely associated with value and value management. These aspects force projects to be

justified in terms of the balance between strategic needs and wants met against resources used. According to HM Treasury's Infrastructure UK (now IPA), the WLC in construction can be determined by measuring against suitable thresholds of affordability and quality agreed at the outset. However, benefits are really materialised from the stages post contract award as pictured in Figure 3-11 below (HM Treasury, 2013), and therefore any evaluation of that is by definition an ex-post exercise.



Source: HM Treasury (2013)

Figure 3-11: Ability to influence outputs and benefits during the project life

While the early stages until contract award are most critical, frequently the later stages receive more attention as that is when PPP/PFI projects deliver operationally against a defined set of output specifications. Consequently, outputs and benefits may be realised. The evaluation requires a whole-life analysis, not just on cost, but on a range of qualitative and quantitative factors that prove VfM. The ability of VfM tests to meaningfully influence project outputs and benefits diminishes over time, as shown with the curved line in Figure 3-11. Hence, it is important to start right from the outset. HM Treasury have learned that whole-life VfM should be assessed at multiple points throughout a project's life (HM Treasury, 2011a; HM Treasury, 2013). These are marked at each gate in Figure 3-11 above. The ex-ante assessment happens at project inception on the Strategic Outline Business Case (SOBC); prior to public launch of procurement there is an Outline Business Case (OBC); and prior to contract signature there is a Final Business Case (FBC). There is less clarity about the means to undertake ex-post evaluations, especially in a UK PPP/PFI context. An evaluation is defined in the Green book as: *"Retrospective analysis of a project, programme, or policy to assess how successful or otherwise it has been, and what lessons can be learnt for the future. The terms 'policy evaluation' and 'post-project evaluation' are often used to describe evaluation in those two areas"* (HM Treasury, 2011a, p. 102). The book also highlights that the technical methodologies used for appraisal and evaluation are similar. Each should identify and measure, where possible, both the direct and indirect benefits of the policy, programme or

project. The main difference is that evaluation is based on actual data, and appraisal on forecasts or projections.

At project level, a standard form of PFI contract incentivises operational performance with penalty charges. Akintoye and Beck (2009) state that it is difficult to know the degree to which the penalty and incentive system operates to ensure satisfactory delivery of contracted services. This is done for the following reasons: first, the sanction is not effective enough in relation to the overall unitary charge, which suggests that the scale of the penalties is relative to the annual payments; secondly, the public sector does not report the standards of performance nor the amount deducted for poor performance. At PPP/PFI policy or programme level, Sanchez and Robert (2010) point out that it can be more difficult to find indicators for measuring the achievement of objectives during the progress of project portfolios. The authors suggest developing a set of strategic KPIs to compare and relate objectives achieved. The indicators proposed help measure the achievement of a portfolio's strategic objectives considering the realisation of key benefits. This approach stimulates identification of strategic interdependencies between projects that the portfolio is composed of, also facilitating the understanding of how the performance of a single project affects the overall performance of a portfolio. These KPIs can also be used to monitor the materialisation of risks and opportunities influencing the strategic performance of a portfolio.

Sadly, too often simply a traditional public sector procurement option is compared against PFI/PF2 without considering other tools, for instance KPIs. Some general lessons from Infrastructure UK (now IPA) include (HM Treasury, 2013):

- Too much reliance was placed on the outcome of the quantitative assessment.
- The PSC was only as good as the information that is entered. It can be inadequate sometimes.
- Figures were capable of manipulation (questions on the reliability of optimism bias) and inadequate evidence was available for some figures.
- PFI/PF2 could be chosen for the wrong reasons (to obtain off-balance sheet finance).
- The UK system of PFI credits (funding subsidy for PFI) tilted balance in favour of PFI approach.
- Some projects were chosen where the case for PFI was marginal – especially in the face of increasingly expensive long-term debt.
- VfM was proposed as a concept to compare options and inform decisions – it is not, however, a perfect science; it can be abused, and judgement is still required.

To address some of these lessons, the UK government abolished the PFI credits, commenced a full review of PFI in 2010, launched a new PF2 policy and guidance in 2012, introduced a minority public equity stake on PF2 contracts, published a Procurement Route Map[25] in 2015, and imposed new transparency regulations on operational accounts.

[25] UK government procurement route map website: www.gov.uk/government/publications/improving-infrastructure-delivery-project-initiation-routemap (visited: Dec-2015)

3.3.5 Private finance (PFI/PF2) procurement in construction

The PFI model was introduced in the UK in 1992, to encourage the creation of consortia to bid for public projects and services. These project companies include investors and contractors with complementary strengths in construction, design, financing, management and operation of the projects for which they are bidding. In the public sector, it became clear that PFI is not a universal solution to cover all complex situations. PFI was increasingly seen as a facilitator for projects, including for those which initially had no PFI element (Roe and Jenkins, 2003, p. 195). According to Roe and Jenkins (2003), in the early 2000s the intention was to use PFI increasingly in a standardised way. PFI contracts are now standardised in the UK.

Most PFI and PPP contracts are procured following the negotiated procedure under the Public Services Contracts Regulations 1993 or 2006. Two EU procurement directives, one applying to public sector contracts (Directive 2004/18/EC) and one applying to contracts in the utilities sector (Directive 2004/17/EC), entered into force in April 2004. The main change relevant to PFI projects was the use of a competitive dialogue procedure instead of the negotiated procedure. In 2014 the EU invoked the old directives and replaced them both with Directive 2014/24/EU on public procurement and Directive 2014/25/EU on the procurement by entities operating in the water, energy, transport and postal services sectors. In addition, the EU launched Directive 2014/23/EU on the award of concession contracts.

Integration and incentivisation of the supply chain, partnership between subcontractors and suppliers, and continuous improvement are the basics for success of PFI as a form of PPP (Roe and Jenkins, 2003, p. 195). HM Treasury has policy responsibility for PFI in the UK. It published multiple reviews of PFI performance along with proposals for improving VfM in PFI procurement (HM Treasury, 2003; HM Treasury, 2006a; HM Treasury, 2008).

Critical reviews of PFI contracts

Following a major critical review of operational performance of PFI contracts in 2010 and 2011 (HM Treasury, 2011c; HM Treasury, 2011b), a more simplified standard was launched in 2012 called Private Finance 2 or PF2 (HM Treasury, 2012). The new form of PF2 is outside the research focus as it was introduced post cancellation of BSF. However, the various national and departmental reviews on PFI have highlighted a number of weaknesses:

- The PFI procurement process has often been slow and expensive for both the public and the private sector. This has led to increasing costs and reduced VfM for the taxpayer.
- PFI contracts have been insufficiently flexible during the operational period, so making alterations to reflect the public sector's service requirements has been difficult.
- There has been insufficient transparency on the future liabilities created by PFI projects to the taxpayer and on the returns made by investors.
- Inappropriate risks have been transferred to the private sector resulting in a higher risk premium being charged to the public sector.
- Equity investors in PFI projects are perceived to have made windfall gains, and this has led to concerns about the VfM of projects.
- Too often, PFI has been used on projects where its application has been unsuitable and has, therefore, failed to deliver VfM.

The reviews also highlighted a number of benefits. These include the private sector's project management skills, innovation and risk management expertise, such as ensuring buildings are delivered to a high quality, on time and budget and that assets are maintained to a high standard throughout their lives.

Most of the BSF standard policy documents for PFI were based on Standardisation of PFI Contracts (SoPC). This section critically explores the applicability and effectiveness of the SoPC3 (released in 2004) and SoPC4 (released in 2007) criteria in terms of VfM and conflict management (HM Treasury, 2004a; HM Treasury, 2007). The SoPC3 provided the basis of public sector-specific guidance and contracts in health, education, defence, prisons, transport and LA buildings. Although the successor standard form of contract called PF2 was never used under BSF (and therefore not analysed as part of this research), a number of changes were introduced to address weaknesses and criticism of PFI, with a public equity stake, faster procurement times, easier renegotiations and more transparency. These are summarised as follows (HM Treasury, 2012):

- The creation of a central government unit to invest in projects as a minority shareholder.
- A competition to identify equity co-investors in a PF2 project after the appointment of preferred bidder.
- introducing a process which incentivises the achievement of a competitive tendering process lasting no longer than 18 months, and limiting projects to those requiring capital investment of £50m or more;
- A more comprehensive set of standard documentation.
- Removal of soft FM services from the scope of the contract, with a view to increasing flexibility.
- Reallocating risks to the public sector in respect of incurring capital costs resulting from changes in law, utilities costs, contamination and insurance.

The guiding principle of best practice of the original PFI was that risks should be allocated to the party best able to manage or bear these in order to produce the economically optimum solution. In order to reduce conflicts, the standard contract was provided with key legal issues: risk allocation, service definition, payment mechanisms and performance monitoring, changes in service commencements, change in law, relief events and force majeure, early termination, treatment of asset on expiry, and growth of secondary markets (HM Treasury, 2004a).

SoPC3 and SoPC4 were designed to prevent lengthy negotiations and to some extent they have been successful. However, a few areas may remain to be negotiated through dialogue, due to specific issues that apply differently to different projects. A common form of dispute resolution in PFI involves a three-stage process:

1) The authority and contractor consult with each other for a fixed time period in order to come to a mutually satisfactory agreement.
2) If consultation fails, the parties may put their case to an expert to decide. This expert is appointed from a panel of construction or operation experts. It may be useful to consider alternative dispute resolution, such as mediation or early neutral evaluation.
3) If either party is dissatisfied with the expert's decision, it may take the matter to adjudication, arbitration or even to the courts for a final and binding decision. The method of appointing the arbitrator should be set out in the contract.

Point 3 is an adversarial form of dispute resolution which is very costly and requires much time and effort. It is often recommended that a fast-track dispute resolution process is included in the contract to deal with certain pressing issues (HM Treasury, 2004a, pp. 209-216).

Historical implications of SoPC

Historically, the propositions about PFI contracts may sound ambitious, but the guidelines were not always adopted that way. Before SoPC3 was launched, Akintoye et al. (2003b) listed seven barriers to the adoption of PFI proposed by different project participants:

1. Risk management is not being applied adequately in the PFI process.
2. High costs of PFI procurement: companies pay millions on bidding costs, clients pay heavily for professional advisors.
3. Negotiations are lengthy, complex and involve a great number of parties.
4. Difficulty in specifying quality of a service compared to specifying the asset. Lack of clarity can result in post-contract disputes.
5. Pricing FM services in a vacuum during the bidding stage (due to poor design).
6. Potential conflicts of interest: different parties are looking at the scheme from different perspectives.
7. Clients are unable to manage PFI projects properly, especially the consultants.

According to Edwards and Shaoul (2003, p. 383), one implication in relation to conflicts in PFI school projects is a lack of process control of both its design and operation to ensure that decisions are made by the LA and the school. They argue that: *"under circumstances where the government is actively promoting PFI by only making funding available for capital investment under PFI, it is difficult to reconcile policy promotion with policy regulation"* (p. 383).

3.3.6 Risks associated with project finance in social infrastructure

Infrastructure as an asset class is characterised by both systemic risks (e.g. political, regulatory, currency, inflation risks) and idiosyncratic risks (i.e. project-specific risks). While the first category of risks can be applied to calculate various investment strategies for a stock or portfolio of infrastructure assets (with proven methods such as the Sharpe ratio, capital asset pricing model, or the Fama and French multi-factor model), this is harder for the second category of project-specific risks. Bing et al. (2005) categorise specific risks pertaining to PPP/PFI projects from the literature, as shown in **Appendix F2**, with the attendant risk factor level groupings (macro, meso and micro) and categories (as in Table 3-1 below). In addition, BSFI (2011) catalogue the most common risks inherent to LEPs and their typical supply chain contracts. A summary and assessment of these specific risks is in **Appendix F1**.

Macro level	Meso level	Micro level
Political/government policy	Project selection	Relationship
Macroeconomic	Project finance	Third party
Legal	Residual risk	
Social	Design	
Natural	Construction	
	Operation	

Source: Bing et al. (2005)

Table 3-1: PPP/PFI risk factor category groups

Idiosyncratic risk is also called diversifiable, unique, unsystematic or specific risk. Specific risk is the risk associated with individual assets; within a portfolio, these risks can be reduced through diversification (e.g. specific risks cancel out). On the contrary, systemic risk (also known as portfolio risk or market risk) refers to the risk common to all types of securities, except for selling short; it cannot be diversified away within one market. Within the market portfolio, asset-specific risk will be diversified away to the extent possible. Systemic risk is therefore equated with the risk (standard deviation) of the market portfolio (Elton et al., 2013).

Risk evaluation is complex, requiring the analysis of risk from the different perspectives of the public and private sector participants (Grimsey and Lewis, 2002). There are also several approaches to infrastructure asset valuation calculations based on inherent systemic risks; however, a discussion of these falls outside the scope of this PhD.

3.3.7 Procuring complex performance

Losing governance control due to high levels of complexity is one of the idiosyncratic risks in alternative procurement models, such as PPP/PFI. In BSF projects, the complex structures used as a delivery mechanism have arguably led to limited and aggregated financial reporting, a loss of control over public spending, and blurred lines of responsibility and accountability (Shaoul et al., 2013). Complexity plays a crucial role in determining whether large projects succeed or fail (Flyvbjerg et al., 2003; Miller and Lessard, 2000; Morris and Hough, 1987; Williams, 1999; Burke and Morley, 2016). Previous research suggests complexity may be a significant factor in a project's failure to achieve cost, time and quality objectives (Caldwell and Howard, 2014). Brady and Davies (2014) examine the project complexity literature to develop a simple framework consisting of structural and dynamic complexity, as shown in Table 3-2.

Type of Complexity	Conceptual Contributions	Implications for Management
Structural complexity *(arrangement of components and subsystems into an overall system architecture)*	Systems hierarchy and interdependence among components (Simon, 1962; Hobday, 1998; Shenhar & Dvir, 2007)	Decompose the project or program into more manageable sub-components
	Systems integration (Sapolsky, 1972; Sayles & Chandler, 1971; Prencipe et al., 2003; Davies & Mackenzie, 2014)	Systems integrator manages technical and organizational interfaces
	Stakeholder relationships (Loch et al., 2006, p. 52; Dvir & Shenhar, 2011; Hertogh & Westerveld, 2010), socio-political complexity (Geraldi et al., 2011), and cultural differences (Scott et al., 2011)	Collaborative arrangements— integrated project teams, co-location; proactive stakeholder communications, transparency, and engagement strategies
Dynamic complexity *(changing relationships among components within a system and between the system and its environment over time)*	Foreseen and unforeseen uncertainty (Klein & Meckling, 1958; Loch et al., 2006; Hertogh & Westerveld, 2010; Edmonson, 2012)	Experiments, prototyping, trial and error learning
	Complex coordination requirements and interdependencies arising from the integration of multiple components (Sapolsky, 1972; Sayles & Chandler, 1971) and technological uncertainty (Shenhar, 1993); teaming (Edmonson, 2012)	Flexibility, late design freeze, keeping options open; concurrent engineering, parallel trials; off-site testing before trying new products or processes
	Market uncertainty and novelty (Wheelwright & Clark, 1992; Loch et al., 2006; Shenhar & Dvir, 2007; Edmondson, 2012)	Learning and feedback from user needs and customer requirements; learning, experimentation and collaboration multi-functional teams
	Pacing and urgency (Gersick, 1994; Eisenhardt & Tabrizi, 1995; Grabher, 2002; Shenhar & Dvir, 2007)	Scheduling and planned action to deal with temporal milestones and rapid, mutual adaptation in response to unplanned events

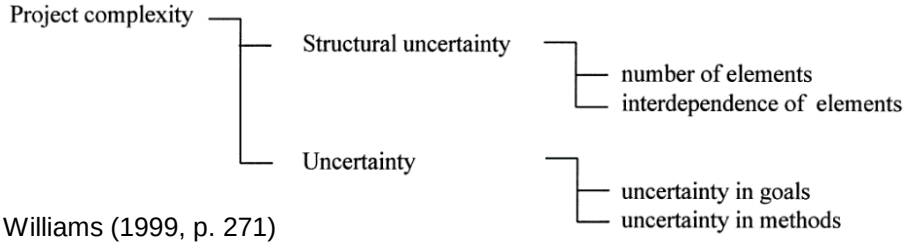
Source: Brady and Davies (2014, p. 24)

Table 3-2: Conceptualising project complexity and its management

These authors cite Williams (1999), who points out that the inability to manage complexity has been recognised as a major factor in project failure for a number of years. However, complexity remains ambiguous and ill-defined in much of the project management literature (Geraldi, 2008), and there has been insufficient attention paid to early studies of systems analysis, contingency theory and complex projects. Contingency theory as a way of defining project complexity was used by a number of scholars Brady and Davies (2014) put forward. The essence of the contingency theory is that *"organisational effectiveness results from fitting characteristics of the organisation, such as its structure, to contingencies that reflect the situation of the organisation"* (Donaldson, 2001, p. 1). Contingency theory is especially useful when there is a lack of an established overarching theoretical framework with an emphasis on contextually grounded approaches based on contingency fit rather than a single best way to manage an organisation (Donaldson, 2001; McAdam et al., 2016). Building on systems theory, early contributions to contingency theory have argued that organisations – including projects and matrix structures – can be regarded as systems of interacting components operating in different environments (e.g. Lawrence and Lorsch, 1986). Baccarini (1996) proposes differentiation and interdependence as two dimensions to help distinguish between organisational and technological complexity.

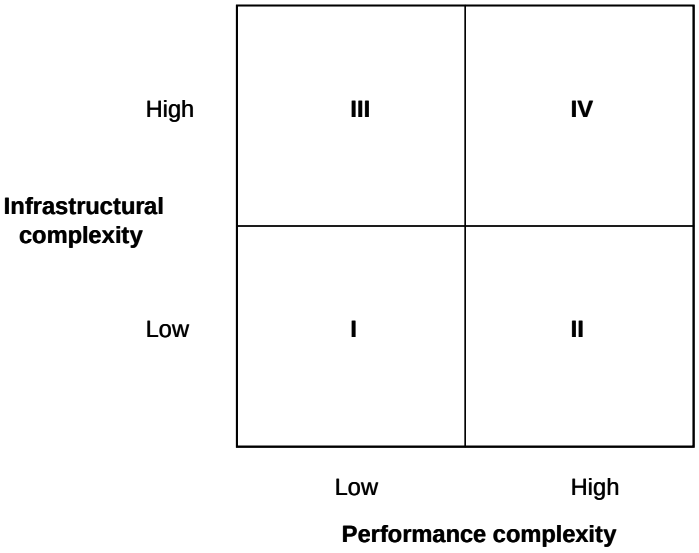
Burke and Morley (2016) cite Shenhar (2001a); Shenhar and Dvir (1996), who argue that complexity is referred to as the number and heterogeneity of different elements that interrelate. Some scholars propose hierarchical frameworks for analysing complexity based on the number of components, systems and subsystems involved, while others focus on the degree of difficulty in specifying work activities and causal relations and sequences in advance (Söderlund, 2002). Jones and Deckro (1993) focus more on the task, and define technological complexity as a concept comprising the variety of tasks, the degree of interdependencies within the tasks, and the instability of the assumptions upon which the tasks are based. It is this complexity that leads to interdependence, whereby *"members must keep interrelating with one another in trying to arrive at viable solutions"* (Goodman and Goodman, 1976, p. 495). Davies and Brady (2000) argue that firms often undertake categories of projects that are similar and therefore involve repeatable and predictable patterns of activity. This, in turn, leads to economies of repetition and predictability, both in behavioural patterns and in outcomes.

Differentiation refers to the number of components (task, specialists, sub-components and so forth) in a project, whereas interdependence is about the degree of interrelatedness among components. According to Williams (1999, p. 271), overall project complexity can be characterised by two dimensions, each of which have two sub-dimensions:



Source: Williams (1999, p. 271)

Roehrich and Lewis (2014) studied the nature of long-term public private interactions in procuring complex performance. Procuring complex performance has been defined by Lewis and Roehrich (2009) in terms of a matrix (see Figure 3-12), comparing high and low performance complexity with high and low infrastructural complexity.



Source: Lewis and Roehrich (2010)

Figure 3-12: The procurement complexity space

Relevant literature highlights two dimensions of performance complexity that have particular relevance to subsequent procurement decisions (Caldwell and Howard, 2011; Lewis and Roehrich, 2010). The first relates to the performance complexity itself (Danaher and Mattsson, 1998), a function of characteristics such as the level of knowledge embedded in the performance (e.g. the ability to type up minutes of a project meeting compared with the ability to read a Gantt chart) and/or the level of customer interaction (e.g. scripted performances compared with performances that are empathetic with respect to language and culture (Youngdahl and Ramaswamy, 2008)). Knowledge-intensive and highly interactive services like management consultancy have traditionally presented a significant challenge for procurement processes because they are difficult to specify beforehand and, correspondingly, difficult to measure and monitor. This has often meant that they are a controversial area of public and private expenditure. Second, there is the complexity of the infrastructure through which performance is enacted. This complexity can be characterised by the extent to which it is bespoke or customised (Brady et al., 2005b). Infrastructure procurement is often irregular and, as a result, buyers often rely heavily on specialist suppliers. Lewis and Roehrich (2010)

Figure 3-12 combines both dimensions into a matrix of total procurement complexity. The top-right quadrant of the matrix, labelled category IV, represents the highest level of aggregate complexity and provides a definition of procuring complex performance: *"inter-organisational arrangements that are characterised by significant levels of performance complexity (i.e. must include numerous knowledge intensive activities) and infrastructural complexity (i.e. must include substantial bespoke or highly customised hardware and software elements)"* (Lewis and Roehrich, 2010, p. 3).

Table 3-3 summarises each category and provides illustrative examples.

Category	*Example*
I	Domestic waste collection service. Here, a public authority procures a service with a simple specification and stable demand patterns (low performance complexity), based on well-known technologies operating in a fixed area (low infrastructural complexity).
II	Management consultancy services, in particular 'grey matter' assignments such as senior-level policy guidance, are a good example of high performance complexity (i.e. knowledge-intensive and strongly client relationship/interaction driven) and low infrastructural complexity.
III	An off-shored IT support service with a call centre where customer interactions are limited in scope and carefully scripted (i.e. low performance complexity) is delivered via relatively sophisticated and complex technological infrastructure.
IV	The UK governments' (aborted) BSF programme for renewal of all primary and secondary schools over a 15-year period for instance. Major building contractors could win a LEP contract to develop and deliver a portfolio of schools and other social infrastructure (a mixture of new build, extensions or refurbishments) and provide long-term maintenance services for the infrastructure together with various operational services including ICT (high infrastructural complexity); all this would be procured under PFI or availability-based contracts that provided for different levels of output specifications and performance conditions (high performance complexity).

Source: adapted from Lewis and Roehrich (2010)
Table 3-3: Categories of performance complexity

From the examples in Table 3-3, it is clear that LEPs fit in category IV of the procurement complexity space, with both high levels of infrastructural complexity and high levels of performance complexity. Roehrich and Lewis (2014) alert us to the relationship between systemic complexity and the complexity of contractual and relational exchange governance in such arrangements. They suggest that managers should consider the manageability and enforceability of complex contracts in combination with the formation of inter-personal relationships and simplified working agreements in their organisations. This was debated in the context of partnering in PPPs at section 3.2.

3.3.8 Summary of complex procurement systems

Complex PPP/PFI procurement is intrinsically practical, but implicitly deals with the delivery of benefits and allocation of risks. It sets out to deliver built assets, services or a hybrid of both whereby various participants agree to undertake various actions or duties during a long-term period. The expected result is a set or series of benefits (often expressed as outcomes) and for the delivery of VfM (often expressed as outputs). Delivery happens through projects, where the instigator is the party with both the need and resources. The PPP procurement method handles what is being procured, by whom and how. All three areas are integral to this research,

with an additional focus on organisational learning. Dealing with what is being procured, by whom and how is looked at through the academic lens of risk; this also implies the expected benefits of why complex PPP procurement systems may be useful. If parties involved in complex PPP/PFI procurement systems fail to think about outputs and benefits and inadequately apply approaches to risk management, it has a diminishing impact on best VfM (which was explored in section 3.2.4).

The trend of further standardisation of processes and systems in PPP contracts that started in the early 2000s has led to better standards in order to reduce time delays, professional fees and costs involved on projects. Examples include: improvements in dealing with risk management (risk awareness, training and allocation), development and analyses of historic performance datasets, re-calibrated payment mechanisms, remote helpdesk and handheld technology, sophisticated performance measurement systems, better governance and communication structures, and better protocols for lifecycle, variations and benchmarking.

Since 2010, there have been multiple critical reviews of the PFI standard forms of contracts being used in the UK. These highlighted several risks and some benefits, as was discussed in section 3.3.4. In 2012, after the cancellation of BSF, the UK government introduced the latest standardisation of PF2 contracts. Parties involved in PPP/PFI procurement should continually bear in mind the correct adoption of best practice and be aware of how to appraise whole-life VfM and how to evaluate the delivery of outcomes and benefits. Given the long-term nature of these contracts, continued monitoring and performance measurement of operational PPP/PFI projects and periodic evaluations may help to find out more about this.

Key messages:

- Different PPP procurement models can be distinguished by how much risk transfers from the public to the private sector, and the level of public sector involvement.
- The complexity of procurement tends to be higher if more risks are transferred.
- Evaluation of outputs and benefits of PPP/PFI is based on measuring against suitable thresholds of affordability and quality agreed at the outset. However, real benefits are materialised from the stages post contract award. A range of qualitative and quantitative factors are needed that prove whole-life VfM.
- Changes were introduced to address weaknesses and criticism of PFI: a public equity stake, faster procurement times, easier renegotiations and more transparency.
- PPP and PFI assets are known to have idiosyncratic risk, also called diversifiable, unique, unsystematic or specific risk. These are risks associated with individual assets; within a portfolio, these risks can be reduced through diversification.
- The possibility of losing governance control due to the complex nature of PPP/PFI is an example of idiosyncratic risk. Contingency theory or systems theory can help establish an overarching framework with an emphasis on contextually grounded approaches rather than a single best way to manage a highly complex organisation.
- Another way to handle complexity is to break it down into several components, systems and subsystems. BSF LEPs fit in category IV of the procurement complexity space, with both high levels of infrastructural complexity and high levels of performance complexity.

The next section will explore the notion of complex PPP projects as Temporary Organisations.

3.4 Projects as temporary organisations

3.4.1 Introduction

There are multiple definitions found in the literature for the several configurations of projects being Temporary Organisations (TOs). In this section, various definitions are analysed using a variety of theoretical lenses. Burke and Morley (2016) cite Shenhar (2001b), who notes that traditionally, TOs were seen as complements to a permanent structure leading to a dominant focus within the earlier literature on temporary organisations within organisations. More recently, scholars have been drawing attention to alternative configurations of TOs: inter-organisational project ventures (Bakker, 2011), project-based organisations (Davies et al., 2011) and project-based enterprises/firms (Whitley, 2006). Burke and Morley (2016, p. 3) define TOs as *"a temporally bounded group of interdependent organisational actors, formed to complete a complex task"*. Table 3-4 below, extracted from Burke and Morley (2016), sets out the characteristics of different forms of TOs:

		FORM			
		Intra-organizational	Inter-organizational	Project-based organizations (PBO)	Project-based enterprises/ firms (PBFs)
CHARACTERISTICS	**Configuration**	TOs within organizations (either functional or matrix). Primary productive activity might be volume-based or operations driven.	TOs between organizations.	TO as primary unit of production. May exist as a separate department or division within functional parent organization.	TO as sole purpose of firm.
	Parent/ permanent organization	Single	Multiple	Primarily single	None. Primarily individual-based TOs.
	Permanence and personnel	Permanent structure remains once TO complete. Resources re-assigned within permanent structure to either other TOs or line functions.	TO dissolves but separate parent structures remain. Resources re-assigned within individual parent structure to either other TOs or line functions.	PBO remains the permanent organizational framework in which temporary projects are embedded. Resources re-assigned within individual parent structure to other TOs. Project work routine.	Entire legal entity dissolves once project is completed. No structure persists. Resources typically self-employed/highly mobile. Project work routine.
	Project typically assembled by	Single parent	Multiple parents	Single parent	Depends on semantics of particular industry – e.g. broker, producer etc.
	Typical exemplars	Systems development, Organizational change	Crisis response, Construction	Complex products and systems	Film/Theatre

Source: Burke and Morley (2016)

Table 3-4: Forms of temporary organisations

Based on the various forms in Table 3-4, the strategic PPP procurement systems can be regarded as a temporary form of Project-Based Organisation (PBO). Although LEPs have features of a permanent structure as their 10 to 15 years lifespan is longer than many permanent firms survive, and during this period they will have the ability to develop their own workload. PBOs can be internal to the firm, but they often extend beyond the boundaries of the firm to embrace many different organisations in project consortia, joint ventures, alliances and strategic partnerships (Davies et al., 2011; Lundin et al., 2015).

Morris (2013, p. 67) points out that historically *"theoretical, conceptual work in the development of project management has been practitioner focussed, functionalist, instrumental, and largely prescriptive and normative: what could, or should, be done to improve our ability to manage projects better"*. Nowadays scholars of the 'Scandinavian School' focus on the 'actors' and the organisations working on projects, and the reality of that work. It means that there is *"less energy on studying what is meant to happen, and more on what is actually happening"* (Packendorff, 1995, p. 330). Normative guidance is treated with suspicion. The Scandinavian School's actor-centric mode of enquiry, with the main source of information the individuals with their subjective realities, brings about a change in epistemology, in that there will not be any 'truth' beneath or beyond the narration of the project member (Packendorff, 1995). Morris (2013, pp. 69-70) argues that *"while the analysis becomes richer, it is an observer's theoretical discussion that often results; too frequently failing to help companies, or people, know what to do to manage their projects better"*.

Project management research might not only improve the management and organisation of single projects, but also improve the effectiveness of many companies and entire industries (Söderlund, 2004). Hence, the following sections will give a brief insight into some desired characteristics of temporary project organisations, not solely from a theoretical perspective but also taking into consideration the knowledge from policy and practice.

3.4.2 Temporary organisations in the construction industry

The construction industry is well known for its numerous temporary project organisations as well as consortium-style project companies. There is a general lack of clarity about the way construction participants should operate while there are projects with long-term relationships. The Egan report states that effective partnering does not rest on contracts (DETR, 1998, p. 30). Contracts can add significantly to the cost of a project and often add no value for the client. If the relationship between a contractor and employer is soundly based and the parties recognise their mutual interdependence, then formal contract documents should gradually become obsolete. So a contract is not necessary for structuring partnering parties? This might sound revolutionary to the construction industry, though several sources (e.g. car companies Nissan and Toyota) argue that this is one of the main solutions for good collaboration (Roe and Jenkins, 2003, pp. 33-35). But in the author's view, contracts are also an essential part of partnering arrangements. Especially in complex and long-term projects where lots of parties are involved, different understandings are an inevitable danger.

A positive factor may be the increased use of PPP-style consortia over the last few decades. Parties prefer to renegotiate their conflicts rather than taking action on formal dispute resolution in the early stages of a long-term relationship (Roe and Jenkins, 2003, p. 196).

3.4.3 Groups and teams

How do groups and teams collaborate in TOs? There are a number of desirable attributes that can be listed, such as commitment, trust, 'no blame' culture, open communication, openness to change, cooperative working, willingness to share information, flexibility, listening and learning from others, and aiming for continuous improvement (Roe and Jenkins, 2003, p. 164). But Roe and Jenkins (2003) also list problems that may arise in partnering relations, some of which might be reasons why implications develop while working with multiple partners:

- unwillingness to trust team members and a tendency to blame them, not trying to resolve problems;
- resistance to communicate freely, either internally or externally, and to raise problems for early resolution;
- complacency and opportunistic behaviour;
- lack of recognition of the importance of individuals with the organisation;
- lack of individual empowerment;
- unwillingness to share detailed information, skills and people;
- deep-rooted distrust of contractual opponent parties; and
- lack of commitment to improve by management and other people within the organisation.

Although these problems might be valid and true, most of them are general and they are also relevant to permanent 'continuous' organisations. One key characteristic of consortia is the composition of it. Figure 5 in **Appendix C2** illustrates a typical structure of PFI in the UK. The TO is composed by representatives of multiple permanent organisations from different branches of industry, as shown in the figure. All the members of the consortium need to create common goals when a PPP/PFI project is intended. Roe and Jenkins (2003) argue that the UK government and many private sector employers favoured partnering in the early 2000s. Furthermore, many contractors have consciously tried to develop a culture suitable for partnering, as well as training and encouraging their staff to embrace partnering.

For good collaboration from the earliest stages of a project, team-building has a significant importance. But there are also other ways to create shared interests, learning and understanding of long-term benefits of collaborative relationships. According to Cicmil and Marshall (2005), project organisations are characterised by spatial and temporal dynamics of power relations. How the power is being enacted is more often situational than legal. The point of departure is the widely recognised need for better integration, cooperation and coordination of construction project teams. To achieve this, Cicmil and Marshall introduced alternative concepts and approaches that improve collaborative interaction among participating parties. They also cite Suchman (2000), who suggests that a new shared framework needs to be created with excellent processes of communication and power in order to create and stabilise a new set of practices. According to Cicmil and Marshall (2005), the following skills are fundamental in teams:

- Moral and ethical – local understanding of a project's micro-diversity; good enough holding of anxiety; convincing storytelling; cautiousness and practical wisdom;

- Participation and future-driven with performance-improving possibilities – this creates a position from which further actions are possible;
- Interdisciplinary creation of knowledge, not by delegation but socialised – able to address causal ambiguities, interest conflicts and rightful issues;
- Combining endeavours of otherwise two separate functions – capacity of the team members to cope dialectically with and use both rhetoric and technical devices; and
- Reflection takes a public form and influences the emergence of collaborative learning practices – create a collective identity and encourage the collaborators to reflect together on the quality of their participation.

3.4.4 Thinking about and dealing with change

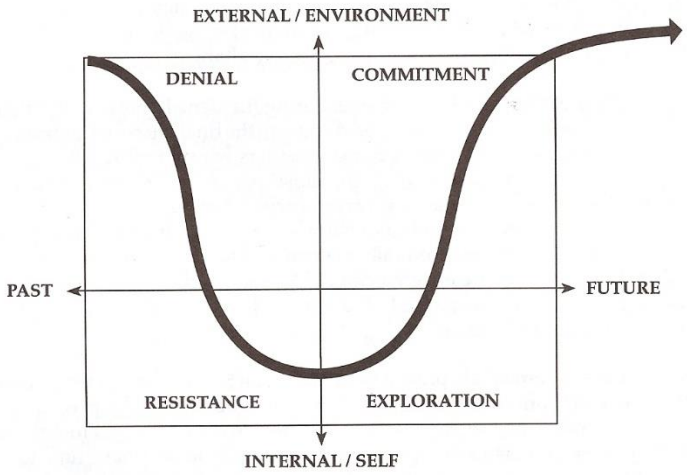
In spite of the enthusiasm for change within the construction sectors concerned, considerable difficulties are often reported. According to Bresnen et al. (2005), cultural change is not only necessary in the 'traditional' construction industry; the project-based nature of construction and the fragmented, geographically distributed nature of the TOs make change difficult to bring about. This is one main reason why change in the construction industry is progressing slowly compared to other industries. Another reason is that change management is not a politically neutral action. Green (1999b) suggests that changes are frequently introduced with direct challenges to existing value systems and power structures in mind. Subsequently, the introduced change will create possibilities for internal disagreement, new conflicts and politics. This implies that change management is a complex subject in construction. Tools for change need to be suitable for a construction environment. Strict structural conditions need to be combined with management that is dynamic and focused on change. Bresnen et al. (2005, p. 558) put forward aspects such as *"the rules of signification and legitimisation, as well as the power resources, mobilised by both individuals and organisations in their attempts to impose or resist change"*. Their research concludes in two case studies that success was achieved *"where there was a good alignment between new and existing project management practices (…), where localised norms were consistent with senior management expectations in encouraging the acceptance of change (…), and where power was more mobilised to support change as opposed to being dispersed in such way as to counteract change"*.

But how do conditions within project-based TOs themselves influence the shaping and basis of new management knowledge as it is being used in practice? Loch and Morris (2002, p. 8) point out that: *"the strong process basis of projects, which despite their transitory character, allows knowledge creation and learning to occur, mirrors the processual nature of organisational learning and knowledge creation".* More about organisational learning is discussed in chapter 4; however, research by Durant (1999) gives a perspective that one of the main conditions for change is creating vision and leadership. The theory and practice of organisational change is often done using a three-stage process of unfreezing, change and refreezing. For example, during the unfreezing phase, the disconfirmation of a slow D&B stage

has to be identified. It may be caused by external pressures, such as coping with complex regulations, involvement of stakeholders, or pressures imposed by shareholders to increase the return on their investment. The disharmony can be measured by benchmarking these factors with the parties inside the TO. The outcomes are the main areas in the organisation that need attention. Once the problems are discovered, a search begins to decide what action is needed to resolve the issue. Thus, as Durant points out, unfreezing involves dismantling past learning points.

The second stage of the change process is about putting new behaviours into the process. Durant (1999, p. 3) indicates that *"redirecting people's attention is an essential part of change"*. Developing skills to enable them to do so is important. Training should be provided to make the project members understand their roles in making change happen. The new rules and norms that enable the desired ways of operating should be created and documented. And as with all situations that change, the beginning of change will be difficult and need lots of energy. When a particular change has been realised, specific rewards should be the result.

Finally, refreezing is meant to measure and strengthen the change. Durant (1999, p. 3) cites that: *"after the training requirements are defined, the reward system, reporting relationships and other systems can be designed to reinforce the new behaviour"*. The change process can be improved by giving promotions and bonuses when desired outcomes are achieved. A good tool for implementing change might be the use of performance measurements such as KPIs. There are also four stages of emotional change, which is called the Kübler-Ross Grief Model (Figure 3-13): Denial, Resistance, Exploration and Commitment. Understanding people's emotions that are often revealed during change better prepares team members to facilitate the change process.



Source: Durant (1999)
Figure 3-13: Kübler-Ross Grief change curve

3.4.5 Possible implications inherent to temporary organisations

Besides the theoretical approach of dealing with the questions about collaboration, change and innovation, another approach of generating answers might be a cause-and-effect approach. Often a pattern of communicative processes and power is formed before the tendering stages, so that ambiguity and tensions might already be built into the very early stages of the procedure. The result of this may affect the whole process.

In relation to innovation and change, Durant (1999) indicates that two-thirds of all organisational changes fail. The most common reasons for failed change initiatives include a lack of commitment from the top, change overload, lack of incentives tied to the change and a lack of training.

Where the culture of a TO might be conservative and well established, then more routine management approaches may be used. Senior management often introduces new managerial initiatives but they can also avoid them by means of a potential obstacle to continuity and diffusing of relevant knowledge (Bresnen et al., 2005).

3.4.6 Summary of projects as temporary organisations

The notion of a TO has been investigated in a project environment and within a built environment context. It was observed that project management on the one hand and organisational learning and knowledge creation on the other hand have a common thread.

The related theory on TOs does not illustrate the effect of repetition from participants on multiple projects. A PPP/PFI project consortium may have had organisational difficulties, so progression was slow. But the next project might go faster because of learning effects from the former. Therefore, a precise measurement approach that tracks and captures learning might be useful during the difficult stages of complex PPP/PFI procurement systems (section 3.3) with bundled, portfolio or pooled structures. The measurements could register the strengths, weaknesses, actions and recommendations for improvement. If a consistent process of measurement is being applied and the realisation of change is being rewarded by means of incentives, then the forthcoming actions (and desired change that follows) can be successful for the PBO as a collective, as well as for individual participants involved.

Other proposed actions are a reduction of the number of purchasing moments, a clear allocation of risks, proactive attitude (‘How do we get the job done’ instead of ‘What to do when things go wrong’), and launching procedures for negotiation. The Egan report illustrated that another important issue for innovation and change is the need for early involvement of contractors, specialist subcontractors and key manufacturers alongside designers and clients.

It all indicates a necessity to create fully integrated teams from different companies that can collaborate smoothly. This may not only lead to better VfM to the client, but also improve

sustainability of solutions in, for example, efficient processes of design, planning and construction. So, if all participants of a TO in construction are capable of creating a well-considered consciousness of this philosophy, then it can be possible to make a good start.

More about the principles of value and collaboration in construction, and especially in the context of a PPP, was discussed in sections 3.2 and 3.3. The body of science about organisational learning will be explored further in chapter 4.

Key messages:

- The construction industry is well-known for its numerous TOs as well as consortium-style project companies, of which PPPs are just one form.
- There is a general lack of clarity about the way participants in construction should operate in TOs with bundles of projects with long-term relationships.
- Strategic PPP procurement systems can be regarded as a temporary form of Project-Based Organisation (PBO)
- Desirable attributes in long-term TOs include: commitment, trust, 'no blame' culture, open communication, openness to change, cooperative working, willingness to share information, flexibility, listening and learning from others, and aiming for continuous improvement.
- Typical barriers in these types of organisations are a general lack of trust, resistance to communicate freely and raise problems, complacency and opportunistic behaviour, lack of recognition of the importance of individuals, lack of individual empowerment, unwillingness to share detailed information, deep-rooted distrust of contractual opponent parties, and a lack of commitment to improve by management.
- A number of recommendations are made by scholars to improve effectiveness of TOs, especially clear thinking about and dealing with change and the need for innovation and leadership. Possible implications are debated from a theoretical perspective.

Having explored projects as TOs within the construction industry, the next section will discuss three models for complex PPP procurement systems to maintain competitive forces in the supply chain whilst in a long-term strategic partnership.

3.5 Inter-supplier competition

3.5.1 Introduction

The trend in the early 2000s following the Egan and Latham reviews (DETR, 1998; Strategic Forum for Construction, 2002), of replacing competitive tendering with long-term relationships, was discussed in section 1.1. Implications of this were set out in chapter 1 and section 2.5.2.2, with further detail in the context of BSF LEPs at **Appendix C3**. Strategic PPP procurement models such as LEP, LIFT and Scottish hubs are examples where competitive tendering is removed after the initial contract award. Under BSF, the prospective private sector partners compete only to provide the initial block of investment, which may be quite small. The LEP is a temporary organisation for a period of ten years, with an option to renew for a further five years. During this time, the private partners in the LEP have the first right of refusal for subsequent projects, whether they were BSF funded or not. That is, the winning bidder enjoys a monopoly position, allowing it to develop and implement new projects in the designated LA area for periods of up to 15 years. Thus, potentially, the organisational structure enables the private, and not the public, sector to champion projects under conditions of no competition (Shaoul et al., 2010). This means that not only, as in PFI, is public money controlled outside the public sector, but BSF LEPs also exacerbate the concerns that have been raised about the lack of competition in PFI and the lock-in to long-term relationships (Lonsdale, 2005).

In a PPP/PFI context, especially those involving long-term strategic partnerships through LEP, LIFT or hub companies, public sector clients spend much time and effort putting competitive pressures on the supply chains in order to obtain better-performing assets and more VfM services. This section gives some theoretical perspective and key directions about how to manage competitive incentives in long-term infrastructure projects while retaining the collaboration of parties involved in the supply chain. In PPP projects, clients are expected to select partners based on VfM rather than solely on lowest costs. There can be many different understandings of fair competition for the tender of the initial capital project. Kadefors (2005, p. 877) concludes that *"an intuitive cost-based norm of fair pricing shapes interaction in construction projects"*. For the contractor, this norm sometimes serves to reduce the risk that they take in a competitive tendering procedure. In other situations, the client may become more suspicious and increases control when a contractor is threatened by a loss.

The following subsections investigate competition in supply chains through the academic lens of Supply Chain Management (SCM). The concept is discussed first, followed by three systems developed by scholars: network sourcing, the strategic competitive positioning model, and the ten force partnership model. The reason for exploring these is that they all seek to address the point of creating competitive forces while there is a long-term relationship with the supply chain parties involved. The last subsection describes the implications for strategic PPP procurement systems when implemented at relevant stages in the construction industry, and its practical impact on organisational relations as well as on professional development.

3.5.2 Supply chain management concepts

The term SCM originates from the Japanese automotive industry sector during the early 1980s (Peck, 2006; Womack et al., 1990). It is a way of thinking about management and processes to coordinate supply chains more efficiently, by managing the associated relationships to deliver customer value through innovation and continuous improvement (Akintoye and Main, 2007; Cheng and Carrillo, 2012; Meng, 2012; Pryke, 2009). SCM in construction can be seen as the management of the network of relationships within which firms are embedded (Dainty et al., 2001; Pryke, 2009). A holistic view is required to ultimately contribute to performance improvement and customer satisfaction within the industry (Pryke, 2009). This contribution is fundamental in the creation of competitive advantage, which reflects the influence of efficient and constructive network relationships on a firm's short-term financial position and long-term competitive power (Van Weele, 2005). Porter (1985) developed the concept of the value chain, which reflects the importance of a focus on value and relates to all activities, both inside and outside the firm, that contribute to its delivery (Van Weele, 2005). Management objectives have therefore moved away from focusing on the finite domain of a single organisation to deliver competitive advantage. Attention is now focused on ensuring competitive advantage for the integrated supply chain (Green et al., 2005). Pryke et al. (2014) cite Lambert and Cooper (2000, p. 65), who affirm this paradigm shift, stating that businesses no longer compete as a sole business entity, but rather in a "supply chain versus supply chain" manner. Pryke (2009) states that the main objective of SCM is to enhance mutual competitive advantage and that this can be achieved through improved relationships, integrated processes and increased customer focus.

In essence, SCM is based on integrating supply chain actors to enable the sharing of knowledge and information (Martinsuo and Ahola, 2010). Edkins (2009) points out that the practice of withholding vital information, such as those relating to risk, can hinder collaboration and prevent the establishment of trust and long-term relationships. SCM is based on a 'holistic' management approach by bridging the gap between actors, thus providing the supply chain with the flexibility in adapting to clients' changing needs, as uncertainties are reduced through the sharing of knowledge and information (Cox et al., 2006; Pryke, 2009; Pryke et al., 2014).

Learning within the supply chain is widely considered to provide the basis for enhanced competitive advantage (Tennant and Fernie, 2013). Also, Cheng and Carrillo (2012) conclude that in manufacturing, suppliers' operational and financial performance improve after they and their customers jointly implement partnerships. A supplementary finding also suggests that a manufacturer should develop partnering mechanisms with suppliers to achieve higher performance for both the individual firms and the entire supply chain.

3.5.2.1 Network sourcing

The first system to be reviewed in this thesis in relation competitive forces in the supply chain is called network sourcing. The system's origins are in Japan, where in the 1980s the average

manufacturing company spent 70% of their manufacturing costs on purchasing goods from other companies: subcontracting. The conceptual design of this subcontracting was a simple tiered pyramid structure. Hines (1994, p. 52) cites Itsutomo Mitsui, one of Japan's leading experts who was speaking in 1990, saying that *"the system of sub-contracting is no longer the closed, highly integrated, pyramidal and hierarchical structure it used to be. The type or relationship and the forms of collaboration are intensifying."* The then new structure became an open and flexible network system, called network sourcing. Introduced in Europe via the electronics and car manufacturing industries, the Japanese approach of the early nineties was slowly adopted in construction industries as it is today (Dubois and Fredriksson, 2008). Hines (1994, p. 52) cites Ikeda (1990), who explains that "*the most outstanding difference (between Japan and Europe) is the tendency of Japanese firms to become deeply associated with a specific customer and develop a wide-ranging labour-dividing relationship"*. The starting point is that the client is focused on consumer requirements and that its suppliers have a total quality focus (to be discussed in section 7.2). In practice, this involves strategies about what to subcontract, where to locate and how many people to bring in. This can only be done through close communication within a group which also closely consort with the same aims (Hines, 1994). According to Cox and Lamming (1999), the following characteristics provide the network sourcing environment with a significant competitive advantage:

1. tiered supply structure with a reliance on small firms;
2. small number of direct suppliers, but within a competitive environment;
3. high degrees of asset specificity and risk-sharing between customer and supplier;
4. maximum buy strategy by each company within the semi-permanent supply network, but a maximum make strategy within the trusted network;
5. high degree of bilateral design joint problem-solving of both customer and supplier equally;
6. high degree of supplier innovation;
7. relationships with network members are close, long-term, based on trust, negotiating and profit sharing;
8. use of supplier grading systems giving way to supplier self-certification;
9. high level of supplier coordination by clients at each level of the tiered structure; and
10. substantial effort made by clients at each tier to develop their suppliers.

The Japanese system places emphasis on long-term relations in which mutual trust, close cooperation and clearly defined responsibilities are observed. Sako (1992) found a number of differentiators based on comparative research between Japan and UK that emphasises this. The main benefits of network sourcing are as follows:

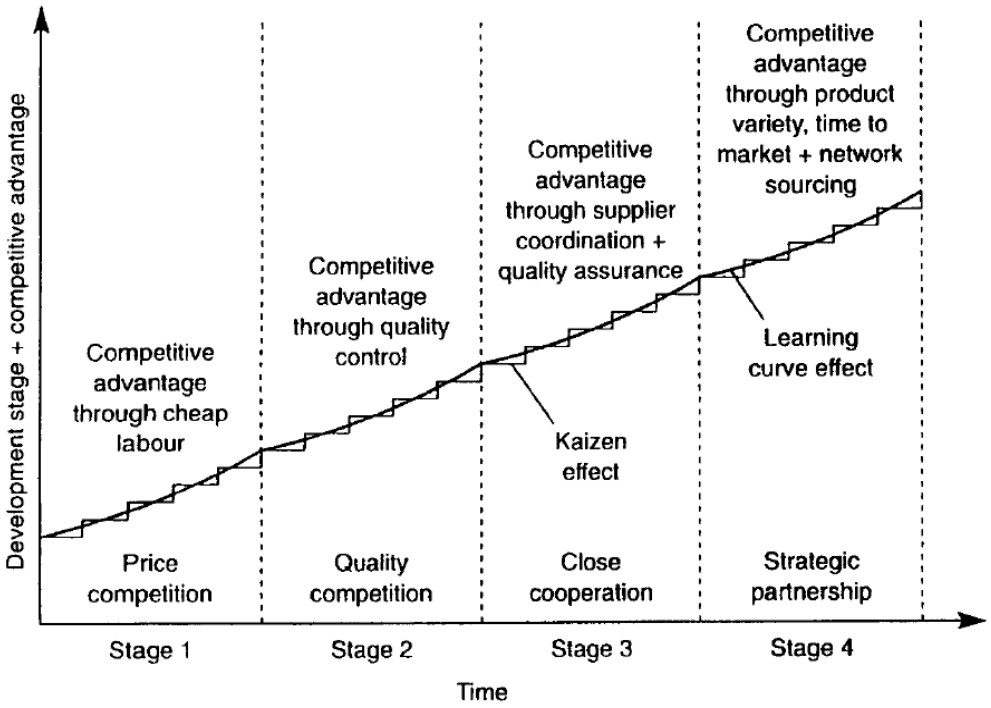
- reduced supplier base is easier to manage;
- lower risk of losing supply source and more supplier loyalty;
- reduced time looking for new suppliers/competitive bids;
- partners are more willing to share/participate in projects;
- better design quality through supplier knowledge/involvement;
- sharing business risks through joint investment/research/development;
- sharing risks of market shifts;
- reduction of inventory levels by information sharing/forecasting; and
- long-term commitment can lead to stable supply prices.

Cox and Lamming (1999) argue that the individual abilities or strategies of buyers or sellers are not important; instead, it is the mutual relationship between the two that is key to their joint strategy. In summary, there are three reasons why network sourcing might be a useful concept to a LEP's supply chain:

- to link existing practices of supplier companies with a practical implementation route to assist these firms in their search for improvement;
- to address misconceptions about how the buyer–supplier relationship operates; and
- to address misconceptions about the development of close buyer–supplier relations.

3.5.2.2 The strategic competitive positioning model

The second system that introduces competitive forces in supply chains is an elaboration of the Japanese system of network sourcing discussed in section 3.5.2.1 above. It can be translated into a model which is designed to help organisations to find out where they are in their search for competitive advantage as well as suggesting a route to improve their competitive position. The Strategic Competitive Positioning Model (SCPM) in Figure 3-9 was developed in Japan by Ikeda (1990), and subsequently widely applied in different industries in Europe.



Source: Ikeda (1990)

Figure 3-14: Stages in achieving competitive advantage and company development

Progression through the model

The SCPM in Figure 3-14 has four incremental stages a company and their supplier network need to go through to deliver benefits while maintaining competitive forces. The benefits gained in each successive stage are the result of the firms' use of the learning curve effect (to be discussed in section 4.9.1) on each new technology, process or method adopted together with the individual efforts, called kaizen improvement or continuous improvement. Within each stage of the SCPM, the learning curve effect will mean that the organisation will gradually

improve its abilities across various aspects: quality, cost, delivery, timeliness. The transition through the stages occurs at different increments for different organisations. The primary impacts on speed are industry competition, growth of product/service use, and maturity of the team or industry. The incremental benefits at each stage of the SCPM that lead to customer satisfaction are set out below (Hines, 1994):

STAGE 1: Price competition

- reduction in price of end product/service due to control of costs;
- control of basic management processes; and
- reduced waste in production process.

STAGE 2: Quality competition

- improvement of quality and reliability of end product/service; and
- reduction of price of end product/service as cost of poor quality is removed.

STAGE 3: Close cooperation (coordination and development of suppliers)

- continued price reduction due to transfer of technology to suppliers;
- improved organisation performance due to knowledge transfer;
- reduced disruption to supply of goods/services;
- improved product/services variety and reduced time to market; and
- improved performance as organisation employs suitable advanced technology.

STAGE 4: Strategic partnerships (development of subcontract network)

- continued improved performance as direct suppliers are involved;
- continued price reduction as technology is transferred to second-tier suppliers;
- firm-specific advantages improve product/service value to customer and consumer;
- further increase in product/service variety and reduced time to market;
- cost of resourcing reduced due to long-term supplier relationships; and
- improved investment in manufacturing leading to reduced production costs.

This research focuses on stage 3, close cooperation, and stage 4, strategic partnership. In these stages, the supplier is no longer a threat to be beaten in negotiations. Suppliers are able to offer competitive advantage to the customer. This mutuality between client and supplier helps lead towards a much closer and longer-term relationship (Goffin et al., 2006). The interaction is now focused on problem-solving, instead of price negotiation. Hines (1994, p. 232) explains that *"the joint problem solving is the expansion of the Total Quality systems developed by the customer into the suppliers as well"*. The pressure on suppliers is much higher than in the first or second stage. Clients will have to take a leading role in coordinating the suppliers in a more personal manner. There is a high level of trust in auditing and grading suppliers. This might be carried out by methods of performance measurement (e.g. KPIs). Close cooperation is only possible with a small number of direct suppliers so that relationships can be better cemented: *"Customers increasingly seek to subcontract out non-core work and generally increase their bought-in spend. This increasing bought-in spend is leading to growth in the number of tiers. (…) This leads to a steeper more tiered supplier pyramid with each company specialising where their particular expertise lies"* (Hines, 1994, p. 233).

For the client in a strategic partnership (stage 4), service assistance of suppliers is a way of creating competitive advantage in terms of improved performance. Clients may also wish to share costing information with suppliers on an open book basis so that waste can easily be located. The main role of the client is coordinating and developing direct suppliers and having

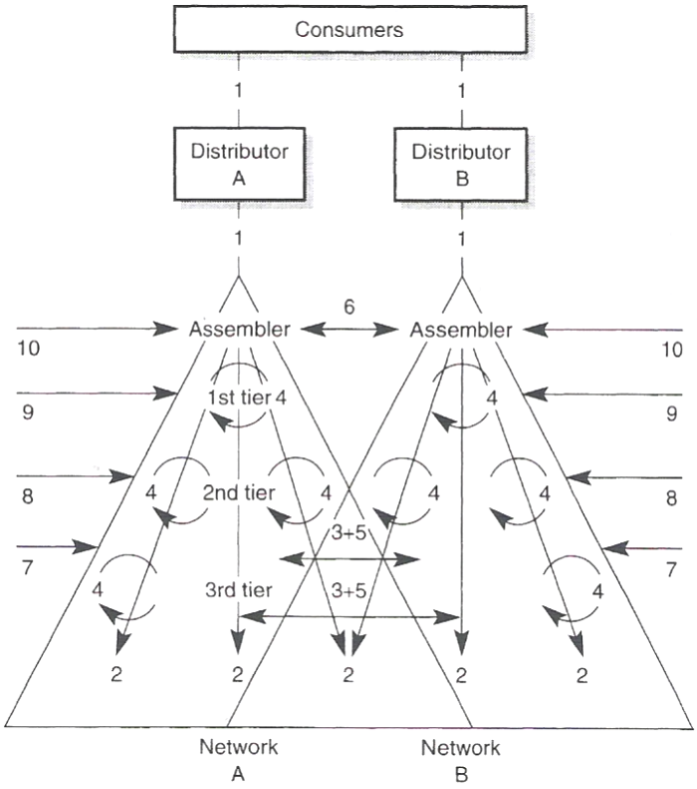
an eye for where mutual competitive advantage can be achieved. The purchasing manager is usually the team leader of a multifunctional team. However, in recent studies by Pryke et al. (2014), it was found that, especially at the lower tiers of the supply chains, organisations are particularly struggling to compete through superior value, collaboratively managing costs, and developing continuous improvement within their supply chains. Research by Briscoe et al. (2004) indicates how the specific procurement decisions of clients influence the way in which longer-term relationships are developed and, as a result, the degree of supply chain integration. It was found that frequent changes in the forms and terms of contract and the preference for competitive price tendering are detrimental to supply chain relationships.

In the 1990s, the UK construction industry predominantly operated in the first stage of the SCPM: price competition. Then, in the 2000s it moved to stages 2 and 3: quality competition and close cooperation. The last phase, stage 4 (strategic partnership), needs a fully integrated supply chain that can be deployed on multiple projects and across the full project life. The Egan reports (DETR, 1998; Strategic Forum for Construction, 2002) encouraged the construction industry to focus on long-term relations, supply side integration and integrated teams to increase value to the customer. *"The industry should create an integrated project process around the four key elements of product development, project implementation, partnering the supply chain and production of components"* (Strategic Forum for Construction, 2002, p. 12). This research study focuses on the third and fourth stages: close cooperation and strategic partnerships. Strategic partnership concerns LEP, LIFT or hub companies looking to seek supply chain benefits while delivering and operating their social infrastructure projects, whereas supply chains of traditional models solely deliver on price competition (SCPM stage 1). Some may have frameworks in place that require them to meet conditions for quality competition (SCPM stage 2). Other strategic frameworks such as ProCure21+ can also operate in stage 4 of the SCPM. The SCPM might encourage both clients and suppliers to commit to creating mutual competitive advantage.

3.5.2.3 Ten force partnership model

A third option to introduce competitive forces in the supply chain is the ten force partnership model, as displayed in Figure 3-15, which also builds on the Japanese network sourcing concept. It explains the pyramidal supply chain structure and the forces involved between companies at different tier levels. Each of the supply chain forces can be explained as follows:

1. the customers' changing needs and expectations;
2. supplier network development through different tier levels;
3. cross-network benefit and profit spread effect;
4. internal subcontractor development;
5. inter-supplier rivalry to find a favoured network position;
6. create tension between cooperation and competition;
7. new entrants;
8. substitutes;
9. stable long-term cheap finance; and
10. government agencies creating a development environment.



Source: Hines (1994)

Figure 3-15: The ten force partnership model

This model can be extrapolated in the context of the LEP model which has its complex supply chain of subcontractors through different tier levels. In the case where main contractors own multiple LEPs, there can be cross-network benefits and competition as shown in Figure 3-15.

3.5.3 Practical benefits of inter-supplier competition

Application of systems such as network sourcing, the SCPM or the ten force partnership model may help position the competing relationships in supply chain organisations (and their connections) to the outputs and benefits of projects in which they are involved. Jones and Saad (2003) argue that long-term purchase agreements are a main condition to achieving ongoing and closer cooperation between purchaser and supplier. The impact of close cooperation on organisations involved is achieved by early involvement of the supplier in the design, services and processes.

The main reasons for development in this area might be derived from a number of problems in the construction industry. Jones and Saad (2003) mention a shift from fragmentation and short-term adversarial relationships to closer and long-term inter-organisational relationships. This development was raised by the reports of Latham and Egan as well as the introduction of SCM in construction. This means that professionals in the construction industry of today might focus more on the well-known and common problems in supply side integration: poor

relationships, insufficient process integration, or a lack of customer focus. Hines (1994, p. 222) declares that *"improved inter-company cooperation would work to the advantage of both supplier and customer, increasing both firms' relative competitive advantage"*. In addition, he argues that the nature of such close inter-firm relations between buyer and supplier will become increasingly long term. But according to Wood and Ellis (2005), the level of truthfulness of the remarkable cost savings which are often attributed to a partnering approach still need to be better assessed.

3.5.4 Potential issues for inter-supplier competition

This section discusses some likely implications in relation to inter-supplier competition.

Lack of client leadership. Briscoe et al. (2004, p. 193) argue that *"clients are shown to be key drivers of performance improvement and innovation and are the most significant factor in achieving integration in the supply chain"*. This supports the observation by Alber and Walker (1997) that change needs to be driven by the customer, which is also mentioned in the Strategic Forum's (2002) emphasis on better client leadership.

Unfair norms and strategies. A problem identified by Kadefors (2005) is that currently cost-based fairness norms are in conflict with the dominant contract allocation and pricing mechanism of competitive tendering. This makes it hard to develop shared ideas of fairness. Kadefors (2005), who cites Loosemore (1999), even argues that trust and close cooperation are likely to break down when problems arise and they are most needed. Altogether, fixed price procurement methods seem to be a case where fairness matters rather than cooperation, which will likely produce conflicts and block an efficient outcome (Grandori and Neri, 1999).

Fragmentation in the supply chain. There is a changing attitude in the UK of project partners involved in different stages of the project process. This restricts the opportunities to develop learning based on repeatability: the learning curve. Brady et al. (2005a) cite Gann and Salter (2000), who argue that the use of PFI and PPPs has shifted the separation of DBMO from government to the private sector, without creating higher levels of integration between the stages. Brady also cites Green et al. (2004), who suggest that clients must improve their continuity of work in order to promote lasting change. They conclude that such developments will be limited to an elite group of firms that serves the needs of the major clients. Akintoye et al. (2003b) suggest one possibility for the public sector is to set up a team that will move from one project to the next. Initiatives like NHS LIFT, ProCure21+ and BSF LEPs were designed to deal with some of these problems.

Collaboration may not solve conflicts at source. A major implication according to Bresnen and Marshall (2000a) is that collaborative approaches do not necessarily remove conflicts at source. Collaborative teams may need to conquer practical barriers, including difficulties in

providing continuity of work and overcoming feelings about long-term relationships being too 'cosy' and consequently less competitive.

Inability to evolve and learn working in close cooperation. Love et al. (2002, p. 5) refer to Morrison and Mezentseff (1997), who suggests that *"a learning alliance is crucial to a cooperative environment where learning is encouraged and reflective in nature and through which participating parties will strive together to meet the objectives of the relationships"*. Mintzberg et al. (1996) suggest that within some cooperative relations, partners may begin to lose their competitiveness and vision once they become dependent on the capabilities of other parties.

3.5.5 Summary of inter-supplier competition

In complex procurement systems with a long-term strategic partnership, clients have to put in a lot of effort to create and keep competitive pressures on the supply chains in order to obtain better-performing assets and more VfM services. This is in contrast with the Egan and Latham reviews, which promote replacing competitive tendering with long-term relationships to drive the same goals of enhanced performance and better VfM.

Hence, it is interesting to explore what model scholars have developed to analyse competitive forces in supply chains while in a strategic partnership. Section 3.5.2 discussed three models from SCM literature: network sourcing, the SCPM, and the ten force partnership model. The close cooperation stage and strategic partnership stage of the SCPM can only take effect if a firm already holds the methodologies of the first and second stages. The third stage of close cooperation can be sustained if the organisation has ascertained a form of TQM internally. Two competing organisations could work together on technical and management issues to remove unnecessary costs from a supplier's manufacturing processes. This would then abolish the need for an adversarial discussion that may lead to tension and price rises.

In practice, the implementation of systems such as the ten force partnership model and SCPM has only been demonstrated in the construction industry in the last decade. The number of improvements is rising as reports have alerted the UK construction industry towards the need for accelerating change. Construction projects based on whole-life VfM assumptions (e.g. integrated DBMO or partnership-type contracts) have emerged and most of these are now in their long-term operational stage. SCM is an increasingly used field of theory for implementing integrated teams, and VfM can be measured by KPIs on a recurring basis (year by year or project by project).

Central to introducing elements of inter-supplier competition in a strategic partnership structure are the benefits gained by organisations (section 3.5.2.2) because of the learning curve effect on each new technology, process or method adopted, together with the individual efforts. This is called kaizen or continuous improvement. The learning curve effect will mean that the

organisations and individuals involved in these strategic partnerships would be encouraged to gradually improve and perform better. The pace may be influenced by level of industry competition, growth of product/service use, and maturity of the team or industry.

Key messages:

- The concept of SCM is closely linked to enhancing mutual competitive advantage through improved relationships, integrated processes and increased customer focus.
- Learning within the supply chain is widely considered to provide the basis for enhanced competitive advantage.
- A number of early models that introduce competitive forces in the supply chain have origins from the Japanese manufacturing industry, such as network sourcing, the SCPM, and ten force partnership model.
- Integrated supply chains can be beneficial for close working relationships and driving improved design, services and processes. This message was reinforced for the UK construction industry with the Latham and Egan reviews.
- There have to be competitive forces, especially in long-term strategic PPP procurement systems. If there is an absence of inter-supplier competition in these supply chains, then this could have implications on leadership, unfair norms and strategies, fragmentation, conflicts, and an inability to learn and evolve.

3.6 Summary of chapter 3

This chapter thoroughly explored the principles of partnering and VfM in PPP procurement systems and discussed the critical issues and academic arguments associated with procurement risks and benefits. It also looked at the essence and implications of projects as TOs, inter-supplier competition in a strategic partnership. Based on the discussions, it might be concluded that strategic partnership procurement systems can be challenging to deliver high-quality, VfM and sustainable outputs, and are subject to many uncertainties. The key problem area explained and discussed before in chapter 1 gives rise to an observed lack of clarity about how the quality of strategic partnership investment vehicles affects long-term VfM and environmental sustainability performance of social infrastructure. There is a wider problem about the lack of understanding about what VfM means in the context of strategic partnership procurement for social infrastructure. This chapter aimed to bring clarity to these aspects.

The NAO had previously raised similar concerns about strategic procurement models and PPPs (NAO, 2005; NAO, 2009). It also had concerns about the oversight of strategic partnering boards in the health sector (LIFT) and the tensions that can arise because public sector employees are fulfilling several capacities in the governance structure. There were difficulties establishing effective working contract governance arrangements in the first BSF projects (NAO, 2009).

Multiple reviews of joint venture governance and control found mixed evidence about the impact of unequal ownership proportions on performance in the case of LEP and LIFT (Aldred, 2008a; Beamish and Lupton, 2009; Shaoul et al., 2013). Research by Dhanaraj and Beamish (2004) suggests that in an international context, minority stakes below 20% signal a lack of commitment and increase the probability of a joint venture failure. The government's rhetoric was one of a joint venture partnership suggesting joint ownership and control. However, the complex organisational LEP structure and planning and commissioning process of BSF means the business does not operate as a true joint venture in accounting terms. Ownership proportions show that the LEP is in fact 90% owned by the private sector, suggesting that it is a subsidiary controlled by the private sector instead of a public private shared ownership.

The original BSF policy did not include these findings at the start, which raises questions for the public and private sector about both the ability of the LEP model to deliver infrastructure and services, and transparency about public money invested in this programme. Also, questions can be raised about the practical use and insights of the contractual performance mechanisms introduced to control delivery and their impact on quality criteria to clients. In this context, it is interesting to consider the following two research questions:

- **How do you effectively measure and manage performance of a strategic partnership procurement system (a LEP) for social infrastructure?**

- **How can key contract performance requirements established by a client (a LA) and its strategic partnership procurement system (a LEP) be measured and managed effectively to ensure that whole-life VfM and sustainability targets can be delivered?**

This chapter built on the background and context of the complex strategic procurement policy under BSF as it was implemented prior to its cancellation in 2010, including the contract structure of the standard LEP model. It can be observed that there is a contrast between the rhetoric of partnership and an ownership structure that blurs the role of control between the LA and the private sector.

Chapter 3 provided further insight and synthesis arising from the existing body of literature in the domains of principles of partnering and VfM in PPPs (section 3.2), risks and benefits in complex procurement systems (section 3.3), projects as TOs (section 3.4), and inter-supplier competition (section 3.5). Each of these areas was embedded in the original BSF policy documents that were written by the UK government in the early 2000s. Based on the review of literature in this chapter and the previous chapter, the need for organisations involved in strategic PPP procurement systems to learn is a crucial factor for improvement in terms of getting better VfM and environmentally sustainable assets.

The following chapter will build on a recurring research theme in management science that was raised first in chapter 1 (section 1.1), then appeared in chapter 2 (section 2.5.2), and again in this chapter (sections 3.2, 3.4 and 3.5), namely that of organisational learning.

Chapter 4 – Organisational and collective learning literature

4.1 Overview

This chapter sets out the wider theories of organisational learning in general management sciences, starting with a number of definitions by various scholars (section 4.2), single-, double- and triple-loop learning by Argyris (1977), followed by an introduction to the notion of collective learning, especially in temporary organisations like LEPs (section 4.4). Senge's five learning disciplines are discussed (section 4.5) along with the concept of systems thinking (section 4.6), as well as some wider associated issues: feedback, dealing with complexity and learning disabilities. The theory of project-based learning is introduced in section 4.8 to encourage a culture of project-based organising and reflection on previous assignments beyond the project, such as organisational networks, project ecologies and the wider fabric of personal networks. The Project Capability Building (PCB) model by (Davies and Brady, 2000) can be used as a repeatable tool to build new organisational capabilities. Some other organisational learning theories are discussed in section 4.9 in order to build a more comprehensive body of theory, tools and techniques. Finally, section 4.10 identifies the gap in theory that this research lacks: a collective learning framework that addresses a philosophical perception of a hybrid form of organisation, one where multiple permanent public and private sector organisations are working together strategically to form new temporary organisations on a repeating basis.

Much of the extensive science domain of organisational learning pertains to the permanent organisation, and to a lesser extent to the temporary (project) organisation. The literature selected in this chapter also includes the latest body of science concerning collective learning and organisational learning in the context of projects.

4.2 Defining organisational learning

Literature on organisational learning and the learning organisation identifies multiple definitions. Simon (1957) essentially laid the early theoretical groundwork by defining the construct of organisational learning and by discussing how, when and why it takes place. Simon's bounded rationality problem exposed that individuals' learning is constrained by their ability to interpret complex reality. He argued that although learning takes place inside individual human heads, *"what an individual learns in an organisation is very much dependent on what is already known to (or believed by) other members of the organisation and what kinds of information are present in the organisational environment"* (Simon, 1991, p. 125). Simon implied that such learning depends largely on the collective reaction of individuals to immediate difficulties, imbalances and problems rather than on deliberate planning. Relevant to the context of construction, the following definitions of organisational learning are selected:

Argyris (1977, p. 45)	“is a process of detecting and correcting error”
Dixon (1999, p. 6)	“the intentional use of learning processes at the individual, group and system level to continuously transform the organisation in a direction that is increasingly satisfying to its stakeholders”
Senge (1990, p. 3)	“is a place where people continually expand their capacity to create the results they truly desire, where new and expansive patterns of thinking are nurtured, where collective aspiration is set free, and where people are continually learning to learn together”
Field and Ford (1995, p. 24)	“is an organisation with a well-developed capacity for double-loop learning; where there is ongoing attention to learning how to learn; where the key aspects of organisational functioning support learning”
Nevis et al. (1995, p. 73)	“the capacity or processes within an organisation to maintain or improve performance based on experience”
Marquardt (1996, p. 19)	“is an organisation which learns powerfully and collectively and is continually transforming itself to better collect, manage, and use knowledge for corporate success”
Kululanga et al. (2001, p. 21)	“the systematic promotion of a learning culture within an organisation such that employees at all levels, individually and collectively continually increase their capacity to improve their level of performance”
Kupers (2012, p. 2531)	“comprises embodied, emotional, cognitive and responsive, individual and/or collective dimensions. It actively creates, captures, transfers, mobilises and modifies knowledge between individuals and groups in a systemic context to enable it to adapt to and to act in a changing environment”

Kupers (2008) cites a comprehensive review of articles which have discussed different aspects of organisational learning and its reinterpretation (Dodgson, 1993; Fiol and Lyles, 1985; Huber, 1991; Cohen and Sproul, 1996; Levitt and March, 1988; Robey et al., 2000; Small and Irvine, 2006; Stewart, 2001). However, the continuous growth of learning research has been accompanied by an increasing lack of clarity and consensus (Crossan et al., 1999; Garvin, 1993) and even growing confusion (Edmondson and Moingeon, 1998; Tsang, 1997). There have been attempts to demystify organisational learning (e.g. (Lipshitz et al., 2006)), and to describe its various ambivalences (Coopey, 1995; Fenwick, 1996; Steiner, 1998). Often the paradoxes (Tosey, 2005) and complexities of inter-relational learning processes are ignored or oversimplified.

Argyris (1977) states that one basic area involves the critical disciplines that enable organisations to address the root causes of their underperformance. Without such factors, organisations merely address the symptoms of their performance problems (Senge, 1990). The factors that facilitate companies to address their root causes of performance problems can also be described as catalysts that promote organisational learning. Kululanga et al.

(2001) developed the list below (Table 4-1) that presents the pairings for two archetypes of learning. On the one hand, you have a simplistic approach to learning, and solutions to organisational problems, as well as deriving options for improvement, focus exclusively on the obvious, such as profits and lower-level tactical issues. On the other hand, the other learning archetype, which involves double-loop or generative learning, goes beyond the obvious to explore the underlying and remote developments that explain the situation under examination.

Addresses symptoms of performance problems of companies	Addresses root causes of performance problems of companies
Single-loop	Double-loop
Adaptive	Generative
Operational	Conceptual
Superficial	Substantial
Symptomatic	Systemic
Rules	Insights
Lower level	Higher level
Tactical	Strategic

Source: Kululanga et al. (2001)

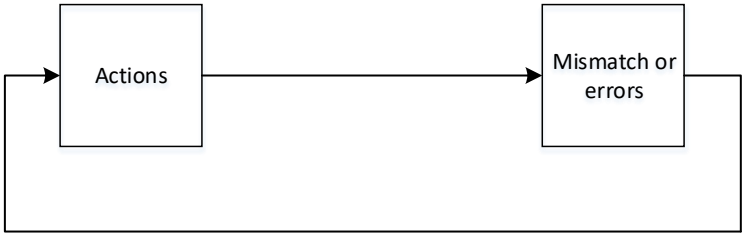
Table 4-1: Characteristics of the two main archetypes of organisational learning

This segregation of the organisational learning process is aimed at facilitating the implementation of learning principles for practising directors in order to promote their ability to shape and change their organisations now and in the future (Kululanga et al., 2001). Moran and Brightman (2000), however, make the following observations about change in the context of organisational learning:

- Change is non-linear and often vaguely defined from start to end – learning organisations might be viewed as organic in the sense that their learning is a continuous process;
- Change interweaves multiple improvement efforts – organisational learning needs to be motivated by improved financial performance and by increasing the focus on the customer, improving and managing work processes and strengthening employee involvement;
- Driving change through both ends of the continuum – the need to develop into a learning organisation needs to be motivated through change that is driven from the top down to create vision and structure. However, there also needs to be a bottom-up drive that encourages participation and involvement. Fundamentally, the creation of a learning organisation needs to be the shared responsibility of everyone in an organisation;
- Human side of learning and change – the development of a learning culture might affect an organisation in such a way that it requires employees to re-examine their own values and beliefs. Unless employees can articulate change from a personal dimension, then it is questionable whether they will be able to do so from an organisational perspective; and
- Benchmarking performance – measurable performance indicators need to be in place, which in turn should be able to support the business in pursuit of its goals.

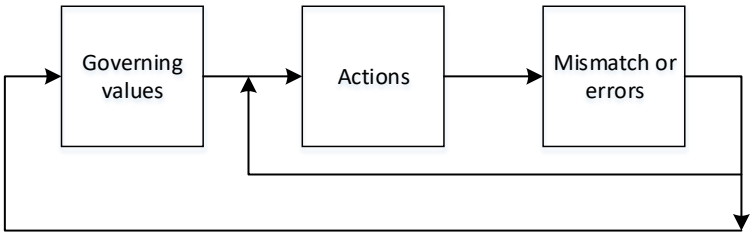
4.3 Single-, double- and triple-loop learning

Based on the above findings, perspectives on 'inter-learning' are presented. Adaptive learning or single-loop learning (Figure 4-1) involves thermostat-like adjustments in response to error detection. Members of an organisation respond to changes in their environment by detecting errors and correcting them, but still maintaining existing organisational norms (Argyris, 1990). In other words, no questioning of the original objective occurs and present policies and goals are preserved in virtually unchanged forms. Essentially, this level of learning does not encourage or result in any reflection or inquiry (Love et al., 2000a).



Source: Argyris (1990)
Figure 4-1: Single-loop learning

Dodgson (1993) equates single-loop learning to activities that add to the knowledge base, competence or routines without altering the fundamental nature of the organisation's activities. As noted in section 4.2, it addresses symptoms but not root causes to problems. Generative learning or double-loop learning (Figure 4-2), on the other hand, occurs when errors are detected and corrected in a manner that modifies an organisation's implicit norms and objectives. Frequently, organisational conflict is a correlate of double-loop learning because the status quo is challenged. Double-loop learning leads to the development of creativity in the problem-solving process, which Argyris and Schön (1978) refer to as "deutero-learning", i.e. learning about learning. This type of learning involves the modification of organisational culture, policies, objectives, strategies and structures. Essentially, deutero-learning occurs when organisations learn how to achieve single-loop and double-loop learning simultaneously.



Source: Argyris (1990)
Figure 4-2: Double-loop learning

The complexity of organisational learning grows when one considers the different types of learning that exist, ranging from adaptive to institutional experience embedded in accumulated organisation efficiencies in terms of experience and tradition. Others suggest single-loop or adaptive learning; double-loop or generative learning; and triple-loop learning as dialogue (Argyris, 1992; Isaacs and Isaacs, 1993). In addition to single- and double-loop learning, Argyris (1992) proposes the construct of triple-loop learning (Bateson, 1942; Visser, 2007),

which focuses primarily on dialogue. Usually, triple-loop learning arises when the organisation finds either that it is still unable to grasp an opportunity or that a particular problem has not been resolved. Double- and triple-loop learning are built into a multidimensional view that describes *"different hierarchical levels of learning"* (Stewart, 2001, p. 3) which are often more circular and integral (Georges L. Romme and van Witteloostuijn, 1999) as they form part of an even more inclusive system of development and learning (Kupers, 2008). Thus, organisations begin to re-examine themselves fundamentally by asking questions such as: What do we do best?, What business are we in? and Who are our customers? These questions also become relevant for the organisations involved in the context of complex strategic partnership procurement systems.

4.4 Collective learning

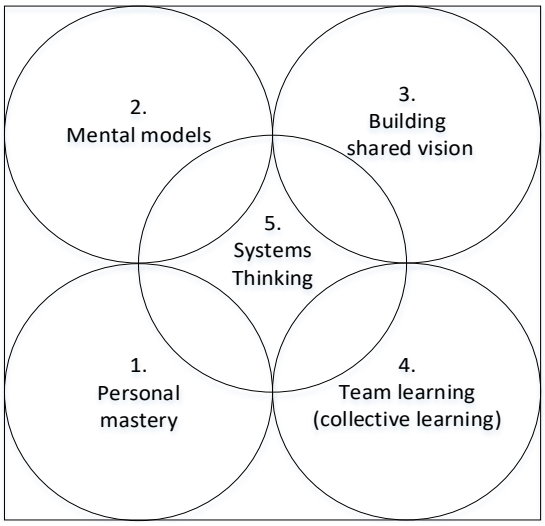
What is it about an organisation that people can learn from? Argyris and Schön (1978) explain that a group of people becomes an organisation when the individuals which comprise it develop procedures for: (1) making decisions in the name of the collective, (2) delegating to individuals the authority to act for the collective, and (3) setting boundaries between the collective and the rest of the world. A collective comes together to form an organisation in order to accomplish a complex task, one which is too complex for any one individual to accomplish. Kupers (2008) argues that learning in and by organisations is an ongoing embodied, responsive and relational practice. As such, it covers internal and external as well as individual and collective dimensions entangled within an interdependent and developmental context and integral cycle. The concept of collective learning draws on a wide body of theory related to learning, organisation theory, sociology and psychology. It recognises the role of social interactions in the construction of values and identity (Garavan and Carbery, 2012). Collective learning is complex and variously defined. It can be conceptualised as *"a dynamic and cumulative process that results in the production of knowledge, institutionalised in the form of structures, rules, routines, norms, discourse, and strategies that guide future action. Learning emerges because of interactive mechanisms where individual knowledge is shared, disseminated, diffused, and further developed through relational and belonging synergies. Collective learning can therefore be conceived as an evolutionary process of perfecting collective knowledge"* (Garavan and Carbery, 2012, p. 646). Garavan and McCarthy (2008) highlight multiple concepts within the domain of collective learning, including organisational learning; a learning organisation; team learning; communities of practice; collective knowledge and memory; and collaborative learning. The latter represents a macro concept that addresses learning at the levels of the team, organisation and society (Cross and Israelit, 2000).

The three concepts of single-loop, double-loop and triple-loop learning discussed in section 4.3 illustrate some of the forms in which collective learning can take place and its importance for organisations. The nature of any knowledge base is individual to firms and is a crucial factor affecting their competitiveness. Collective learning differs compared to organisational learning.

It is dynamic, but the way that it develops is constrained by existing ways of doing things, know-how and routines. Pavitt (1991) argues that the range of possible choices of both product and process technologies depends on its accumulated competence. The improvement of these competencies requires continuous and collective learning. The interconnection between individual and organisational learning assumes that learning begins at the individual level and is subsequently embedded at a collective level (Hogan and Warrenfeltz, 2003). The ability of a project team to learn collectively is paramount for improved productivity and performance (Schindler and Eppler, 2003). However, the nature of construction and engineering projects may inhibit collective learning due to their ephemeral nature and structural characteristics (i.e. procurement method and contract type) (Love et al., 2015b). Swart and Harcup (2013) suggest that an understanding of various levels of learning, how it is transferred and interconnected, is required. This is particularly pertinent in strategic PPP procurement systems, where there are often multiple interdependent organisations, often with conflicting goals and objectives.

4.5 Senge's five learning disciplines

The complexity that organisations involved in large-scale infrastructure developments have to face is phenomenal. Studying organisations that have been through this both successfully and unsuccessfully might help to understand how these firms learned to produce extraordinary results. Most professionals involved in complex projects for over ten years have at least once been part of a great team, a group of people who functioned together in an outstanding way, who trusted one another, who complemented one another's strengths and compensated for one another's limitations, who had common goals, and who produced excellent results. What these people probably experienced was a learning organisation. It may not have had a great start but it learned along the way how to produce extraordinary results (Senge, 2006). Senge introduced five learning disciplines: systems thinking, personal mastery, mental models, building shared vision and team learning. When the framework is applied, it could look like Figure 4-3 below.



Source: Senge (2006)

Figure 4-3: Senge's five learning disciplines

The following subsections will explain and discuss each of the five learning disciplines. The notion of systems thinking will be explored in further detail in section 4.6.

1. Personal mastery

This is the discipline of continually clarifying and deepening personal vision, of focusing energies, developing patience, and of seeing the reality objectively. Personal mastery starts with clarifying the things that really matter and service the highest aspirations. Senge stresses the connection between personal learning and organisational learning, the reciprocal commitments between the individual and the organisation, and in the spirit of an enterprise made up of learners. Organisations learn only through individuals who learn. Individual learning does not guarantee organisational learning, but without it no organisational learning occurs. People with high levels of personal mastery live in continual learning mode and are more committed. Senge groups personal mastery into personal vision, holding creative tension, the power of powerlessness, commitment to the truth, and using the subconscious.

2. Mental models

Mental models are deeply ingrained assumptions, generalisations, pictures or images that influence how teams made out of individuals understand the world and how they take action. Continuous adaptation and growth in a changing business environment depends on institutional learning, which is the process whereby the leadership changes their shared mental models of the company, their markets and their competitors.

3. Building shared vision

The practice of having a shared vision (including goals, values and missions) involves the skills and unearthing shared pictures of the future that foster genuine commitment and enrolment rather than compliance. When there is a genuinely shared vision throughout the organisation as opposed to solely a vision statement, there is a culture where people excel and learn, not because they are told to, but because they want to.

4. Team learning (collective learning)

In literature relating to learning by teams, terms such as group, community, collective and network are often used interchangeably (Hager, 2009). The discipline of team learning is the collective learning process that helps teams do this. Team learning starts with dialogue (or communication), the capacity of team members to suspend assumptions and enter into a genuine process of ‘thinking together’. Dialogue involves learning how to recognise patterns of interaction in teams that undermine learning. The patterns of defensiveness are often deeply ingrained in how a team operates. It is the teams (not individuals) that are the fundamental learning unit in organisations. Unless teams can learn, the organisation cannot learn.

5. Systems thinking

Systems thinking is a conceptual framework, a body of knowledge and tools that has been developed over the past 60 years to make the full patterns clearer, and to help us see how to

change them effectively (Senge, 2006, p. 14). It is also the cornerstone that underlies all of the other four learning disciplines. All are concerned with a shift of mind from seeing parts to seeing wholes, from seeing individuals or disciplines as helpless reactors to seeing them as active participants in shaping reality from reacting to the present, to creating the future. Systems thinking is a discipline for seeing the structures that underlie complex situations, and for discerning high- from low-leverage change. It is a shift of mind, by seeing relationships rather than linear cause/effect chains and seeing processes of change rather than snapshots.

4.6 The concept of systems thinking

The application of systems thinking to the task of understanding how organisations develop and change has been a major impetus to the development of the learning organisation (Senge, 1990). This way of thinking provides a framework for rethinking and integrating existing theories of organisational behaviour and change, organisational dynamics and strategy development (Garavan, 1997).

In his book, Senge explains that organisational learning is on a continuum, a state of practising the disciplines of learning, getting better or worse. He points out that great organisations are often fleeting, enjoying their moments in the sun, then passing quietly back to the ranks of mediocre. Benchmarking best practices can shed new light on what is possible, but can also do more harm than good, leading to piecemeal copying of parts and playing catch-up. All parts need to work together continually. By enhancing each of the four disciplines, the fifth discipline continually reminds us that the whole can exceed the sum of its parts. Systems thinking makes understandable the subtle aspects of the organisation. At the heart of organisational learning is a shift of mind – from seeing ourselves as separate from the world to connected to the world, from seeing problems as caused by someone or something 'out there' to seeing how our own actions create the problems we experience (Senge, 2006). Kululanga et al. (2001) describe learning this as a 'from' … 'to' process, for example:

- From a doing to a thinking workforce,
- From reactive to proactive readiness for change,
- From loss to gain of competitive advantage,
- From status quo to continuous improvement.

The words 'learning' or 'learning organisations' tend to resemble images of classrooms, listening, following directions; in everyday use, learning has become synonymous with 'taking information', in business often referred to as knowledge management. (Senge, 2006, p. 14) defines a learning organisation in its most basic form as: *"an organisation that is continually expanding its capacity to create its future"*. Senge makes a distinction between 'survival learning' or 'adaptive learning' (single-loop learning) which is necessary but it must be adjoined with 'generative learning' (i.e. double-loop learning, Table 4-1) to enhance the capacity to create. He also points out that the research areas of building a continuously learning organisation and the art and practice of collective learning are still largely unexplored (Senge, 2006).

Complexity and systems thinking

The notion of complexity was already discussed in the context of procurement in section 3.3. Senge (2006) argues that complexity in organisations can easily undermine confidence and responsibility. Often people say “It’s all too complex for me” or “There’s nothing I can do. It’s the system.” Systems thinking is the antidote to this sense of helplessness in an increasing world of complexity and interdependence. Systems thinking is a discipline for seeing the structures that are beneath the complex situations, and for discerning high- from low-leverage change. By seeing wholes, it is possible to learn how to foster health (Senge, 2006, p. 69).

Systems thinking is circular; in other words, the structures cause the behaviour and the structure is brought into play by people’s intention and action. This is important because a linear approach, i.e. seeing only individual actions and missing the structure underlying the actions, lies at the root of experiencing powerlessness in complex situations. Senge distinguishes detail complexity and dynamic complexity. He points out that sophisticated tools of forecasting and business analysis, as well as elegant strategic plans, usually fail to produce dramatic breakthroughs in managing a business. They are designed to handle the sort of complexity in which there are many variables. This is detail complexity. In most management situations, the real leverage lies in understanding dynamic complexity. Improving quality, lowering total costs, and satisfying customers in a sustainable manner is a dynamic problem. Real systems thinking concerns a shift of mind: seeing circular interrelationships rather than linear cause/effect chains, and revealing processes of change rather than snapshots.

Feedback

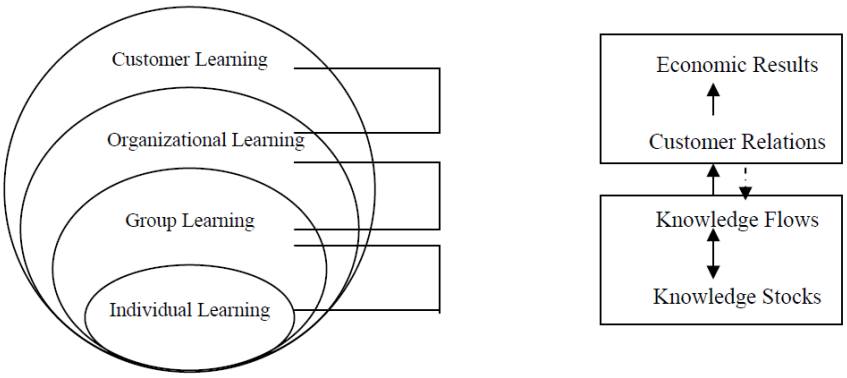
The practice of systems thinking starts with the concept of ‘feedback’, which shows how actions can reinforce (amplify) or counteract (balance) each other. It builds to learning to recognise types of structures that recur again and again. In systems thinking, there is no individual responsible. The feedback perspective suggests that everyone shares responsibility for problems generated by a system. Learning a language is difficult at first, but as you start to master the basics, it gets easier. The multiple feedback processes in an organisation also take some time to get used to. People may find simple statements about causality and responsibility familiar and comfortable. There are plenty of situations where simple linear approaches suffice, and looking for feedback processes would be a waste of time. But when dealing with problems of dynamic complexity, the reinforcing and balancing feedback processes come into play (Senge, 2006).

- Reinforcing (amplifying) feedback processes are the engines of growth. If there is a situation of growing, then reinforcing feedback applies. It can also generate accelerated decline, i.e. a pattern of decline where small drops amplify themselves into larger and larger drops.

- Balancing (or stabilising) feedback applies whenever there is a goal-oriented behaviour. If the goal is to persevere (not move), then balancing feedback will act in a way like the brakes in a car. The goal can be an explicit target (e.g. profit margin) or it can be implicit (such as a bad habit), which despite abolishing, the organisation sticks to nevertheless.

Finally, many feedback processes contain delays, interruptions in the flow of influence which make the consequences of actions occur gradually. In systems thinking, viewpoints are often generated towards the long-term view. That is why Senge reinforces the importance of delays and feedback loops. In the short term, they are often ignored but they come back to haunt in the longer term.

Reinforcing feedback, balancing feedback and delays are all fairly simple. All aspects of systems thinking are built up from these elements; these are the building blocks. However, Scott and Harris (1998) point out that most project feedback systems in place are informal and unstructured and therefore prohibited effective learning from taking place. Organisations should therefore encourage stocks and flows of knowledge to occur in such a way that continuous learning at the individual, group and organisational level will determine the impact on customer relations as the basis for better economic performance (Saint-Onge, 2002). Figure 4-4, adapted from Saint-Onge (2002), shows the interrelation between learning capacity, customer relations and economic results.



Source: Saint-Onge (2002)
Figure 4-4: Value chain between learning and knowledge

Hence, the way in which organisations apply and adhere to their learning capacity is critical to define the external (or internal) links that bring value to the organisation.

4.7 Learning disabilities

Senge (2006) discusses seven common learning disabilities, which can be tragic in organisations if they are undetected. Like pupils who are identified as having a learning disability, and then get targeted assistance, so organisations should be aware of the following:

- **Focus on only an employee's position** – staff have little sense of responsibility for the results produced if they see themselves within a system of which they have little or no influence.
- **Enemy syndrome** – there is in each of us a propensity to find someone or something outside ourselves to blame when things go wrong.
- **The illusion of taking charge** – often, proactiveness is reactiveness in disguise. True proactiveness comes from seeing how we can contribute to resolving our own problems.

- **Fixation on events** – this distracts us from seeing the longer pattern of change that lies behind the events and from understanding the cause of those patterns. The primary threats to the survival of organisations comes not from sudden events, but from slow and gradual processes.
- **The boiled frog parable** – learning to see slow gradual processes requires slowdown of pace and paying attention to the subtle as well as the dramatic.
- **The delusion of learning from experience** – when our actions have consequences beyond our learning and it becomes impossible to learn from direct experience, learning cycles can be particularly hard to see, and thus hard to learn from, if they last longer than a year or two. There is a dilemma that confronts organisations: they learn from best practice but never directly experience the consequences of many of their most important decisions. The most critical decisions made in organisations have system-wide consequences that stretch over years or decades.
- **The myth of the management team** – all too often management teams spend their time fighting to maintain the appearance of a cohesive team. *"Most management teams break down under pressure. The team may function well with routine issues. But when they confront complex issues that may be embarrassing or threatening, the teamness seems to go to pot"* (Argyris in Senge, 1990, p. 25). The word "teamness" can be defined as the ability of individuals to collaborate and work effectively as a team (Glaser et al., 2004). It can be identified by close relationships among team members, their strong commitment to the team's success, and a perceptible unity of team members. Teamness places more emphasis on the aspect of striving for a collective achievement (Glaser et al., 2004; Stawnicza, 2015). Even if team members feel uncertain or ignored, they learn to protect themselves from pain of appearing uncertain or ignorant. That very process blocks out any new understandings which might threaten us. The consequence is what Argyris calls "skilled incompetence" – teams full of people who are highly proficient at keeping themselves from learning (Senge, 1990).

4.8 Learning in project-based environments

Research by Grabher (2004) reveals that by consecutively disentangling the constitutive layers of project ecologies (the core team, the firm, the epistemic community, and the personal networks), the basic organisational architecture of project ecologies is revealed. The temporal nature of PBOs causes a limitation due to any allocating of knowledge that is accumulated in the course of a project (section 3.4). This knowledge is at risk of being assigned to a different task, another team or a new deadline (Defillippi and Arthur, 1998). Due to the overarching focus on deadlines, the culture of PBOs symptomatically leaves hardly any time to reflect on previous assignments (Brady and Davies, 2003; Hobday, 2000). Projects, viewed as singular ventures, combine diverse knowledge effectively; apparently, however, they also tend to forget quickly.

4.8.1 Project-based learning

The importance of using the learning gained through projects to meet a firm's strategic and operational objectives is discussed by Middleton (1967). Unless the experience gained on one project is transmitted to subsequent projects, learning may be dissipated and the same mistakes repeated (Middleton, 1967, p. 81). When a project finishes, members of the disbanded team often have little time or motivation to reflect on their experience and document transferable knowledge for recycling in future projects (Brady and Davies, 2004).

The actual locus of project-based learning extends beyond the boundaries of the individual firm. The perforation of the firm boundaries is an emblematic feature of project ecologies. Project-specific knowledge creation ensues in the epistemic community. The epistemic community involves all project participants who contribute to the production of knowledge to accomplish the specific task, even if only temporarily and partially (Amin and Cohendet, 2004, p. 75). Most importantly, they comprise clients and suppliers but increasingly also major corporate groups to which project ecologies become affiliated.

Core team, firm and epistemic communities represent the organisational layers that are temporarily tied together for the completion of a specific project. Beyond this manifest pattern of organisational networks, project ecologies also reveal a wider fabric of personal networks that endure and stretch out beyond the actual project (Wittel, 2001). Although these more latent networks can be activated to solve project-specific problems, they typically remain in the project background and sustain ongoing learning processes of the individual project members (Starkey et al., 2000).

Cumulative versus disruptive learning mode

The juxtaposition of creating and sedimenting knowledge leads to fundamental association between learning and repetition: repeated cycles of interaction within the organisation and between the organisation and the environment form the basis of learning. Project organising is geared towards moving from the singular one-off venture to repeatable solutions (Brady and Davies, 2003; Brady and Davies, 2004; Davies and Brady, 2000).

Economies of repetition versus economies of recombination

Organisations 'remember' by exercising routines (Nelson, 1982). By handling a range of consecutive and related projects, firms in fact aim at enhancing and accumulating particular 'project capabilities' (Brady and Davies, 2004; Davies and Brady, 2000). Both project-to-project and project-to-business learning allows firms to reap 'economies of repetition' (Davies and Brady, 2000). Economies of recombination accrue from not offering one-off solutions in the strict sense of the word. On an ad-hoc project-to-project level, they flow from bricolage, i.e. the creation of novel combinations of familiar elements and by-products from previous projects. On a more strategic level, firms realise economies of recombination by engaging in a process of moving from first-of-its-kind projects to the execution of portfolios of related

projects (Davies and Brady, 2000, p. 952). Economies of repetition can be obtained by learning to execute a growing volume of bids and projects more efficiently and effectively.

There are benefits to economies of repetition (Davies and Brady, 2000) by transferring lessons from individual projects into a firm-specific set of organisational tools, a distinctive culture and a repertoire of stories, and from economies of recombination that arise from accumulating knowledge into modules that can efficiently be recombined in subsequent projects. In addition, network sociality provides a distributed repository for the know-whom that is indispensable for the relentless rewiring of ties and recombination of teams (Grabher, 2004). Grabher (2004) suggests a categorisation that stretches from firm-based through firm- and network-based to network-based ecologies.

4.8.2 Project capability building model

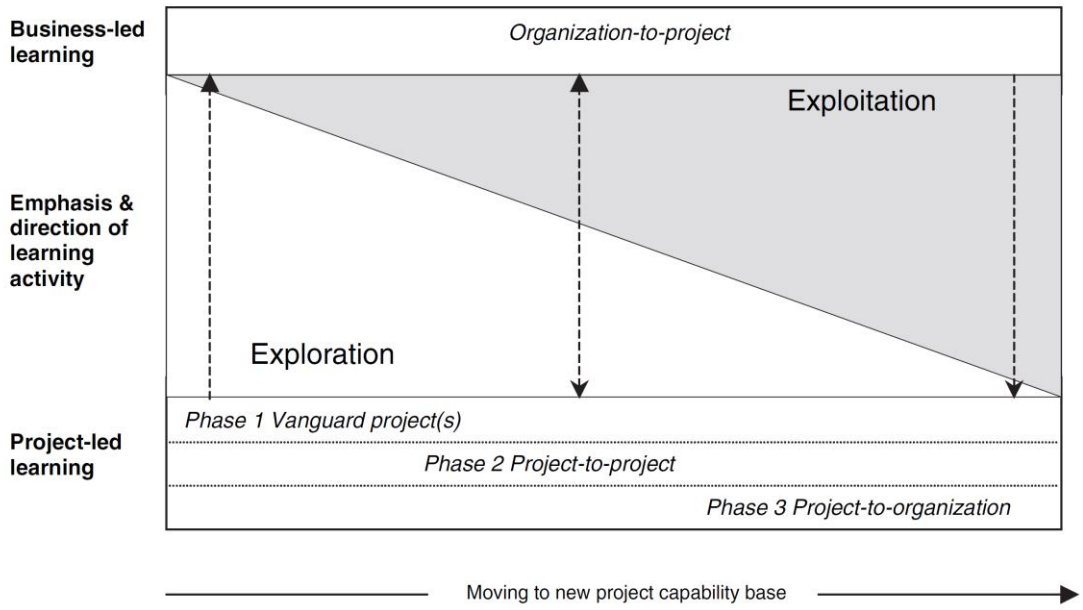
Project capabilities refer to the specific knowledge and experience required to engage with internal or external customers, develop bids or offers, and set up and implement projects (Davies and Brady, 2000). In project-based firms, there is often a disjuncture between project-based learning and company-wide business processes (Gann and Salter, 1998). The problem with this perspective of project-based learning is that it equates project-based activities with non-routine behaviour. Challenging this perspective on project-based learning, it has been argued that performance in PBOs can be improved through exploitative learning because firms undertake similar categories of projects which involve repeatable and predictable patterns of activity (Davies and Brady, 2000). Projects are similar when the same capabilities and routines are required for their repeated execution. The perception that projects perform only unique and non-routine tasks often hides many potentially transferable lessons. Knowledge creation and learning can occur at several different levels (such as the individual, project, firm or industry) and often as an unintended by-product of the project activity (Defillippi and Arthur, 1998). Radical changes in the environment can force a firm into totally renewing its capabilities.

Chandler (1990) argues that the competitiveness of firms in all types of industries depends on two sets of capabilities. Strategic capabilities are required to monitor internal operations and adjust strategies to a changing environment. Functional capabilities organised in departments or silos (e.g. R&D, production and finance) are required to produce standardised products and services in high volumes. Davies and Brady (2000) introduce the additional concept of project capabilities to refer to the core activities of firms that design and produce complex products and systems in low volumes to specific customer requirements. Project capabilities are required to:

- engage with their customers in strategic pre-bid activities;
- prepare proposals or, if the firm is involved in a strategic partnership with the customer, present offers; and
- manage the lifecycle activities involved in project implementation, handover to the customer, and ongoing support.

Davies and Brady (2000) argue that performance can be increased through exploitative learning because firms undertake similar categories of projects in mature or new product markets, involving repeatable and predictable patterns of activities.

Brady and Davies (2004) developed a Project Capability Building (PCB) model as displayed in Figure 4-5 below. It shows how firms producing complex products and systems develop and use project-based learning to build new organisational capabilities.



Source: Brady and Davies (2004)
Figure 4-5: Project Capability Building (CPB) model

The model consists of two interacting and co-evolving levels of learning, each emphasising the different direction and levels of PCB within the firm. The first level involves a series of bottom-up 'project-led' phases of learning that occur when a firm moves to a new technology or market base, and exploration and experimentation with new approaches takes place to develop routines and processes required to execute new radically different types of projects. The second level involves 'business-led' learning (within which the project-led learning is embedded) that occurs when top-down strategic decisions are made to create and exploit the company-wide resources and capabilities required to perform increasingly predictable and routine project activities (Ruuska and Brady, 2011).

4.8.3 Inter-organisational learning along the supply chain

One aspect of organisational learning involves inter-organisational learning along the supply chain (Spekman et al., 2002). On the one hand, it is a desirable extension of organisational learning, developing a firm's knowledge base, and providing fresh insights into markets and strategies (Mohr and Sengupta, 2002). In the literature, such practice is termed "supply chain learning" (Bessant et al., 2003; Manuj et al., 2013). On the other hand, it can lead to unintended and undesirable knowledge transfer, resulting in the potential dilution of competitive advantage (Van Wijk et al., 2008). The need for competitive forces in PPP supply chains was discussed

in section 3.5. A further major obstacle to inter-organisational learning within construction partnering arrangements such as LEPs comes from the transient nature of the project team. Cherns and Bryant (1984) argue that the changes in team membership from project to project are an evident impediment to the transfer of lessons from past projects to future projects. These difficulties clearly not only constitute significant barriers to inter-organisational learning, but also reduce the value of the construction partnership to its members (Franco et al., 2004).

4.9 Other organisational learning philosophies

A number of other learning frameworks that have been researched and practised are briefly considered below but are not discussed further in this research.

4.9.1 Schools of thought in organisational learning

Scholars researching organisational learning usually make some reference to the notion that organisational learning, if implemented properly, is certain to yield superior performance over time (Argyris and Schön, 1978; Bell et al., 2002; Kululanga et al., 2001; Nevis et al., 1995; Senge, 1990; Tennant and Fernie, 2014). A framework by Bell et al. (2002) of four discrete and mutually dependent schools of thought in organisational learning can be applied to explore organisational learning in construction supply chains.

The *economic school* (learning by doing) focuses on the learning that accrues with continuous production. The economic school of organisational learning is focused on encoding inferences and understanding that accrue from the repetitive action and subsequent reaction that occurs with continuous production (Tennant and Fernie, 2013). This approach to single-loop learning capitalises on the detection and correction of errors (Argyris, 1977). The importance of learning by doing is a notion that has variously been referred to as the learning curve or experience curve (Alberts, 1989; Lieberman, 1987).

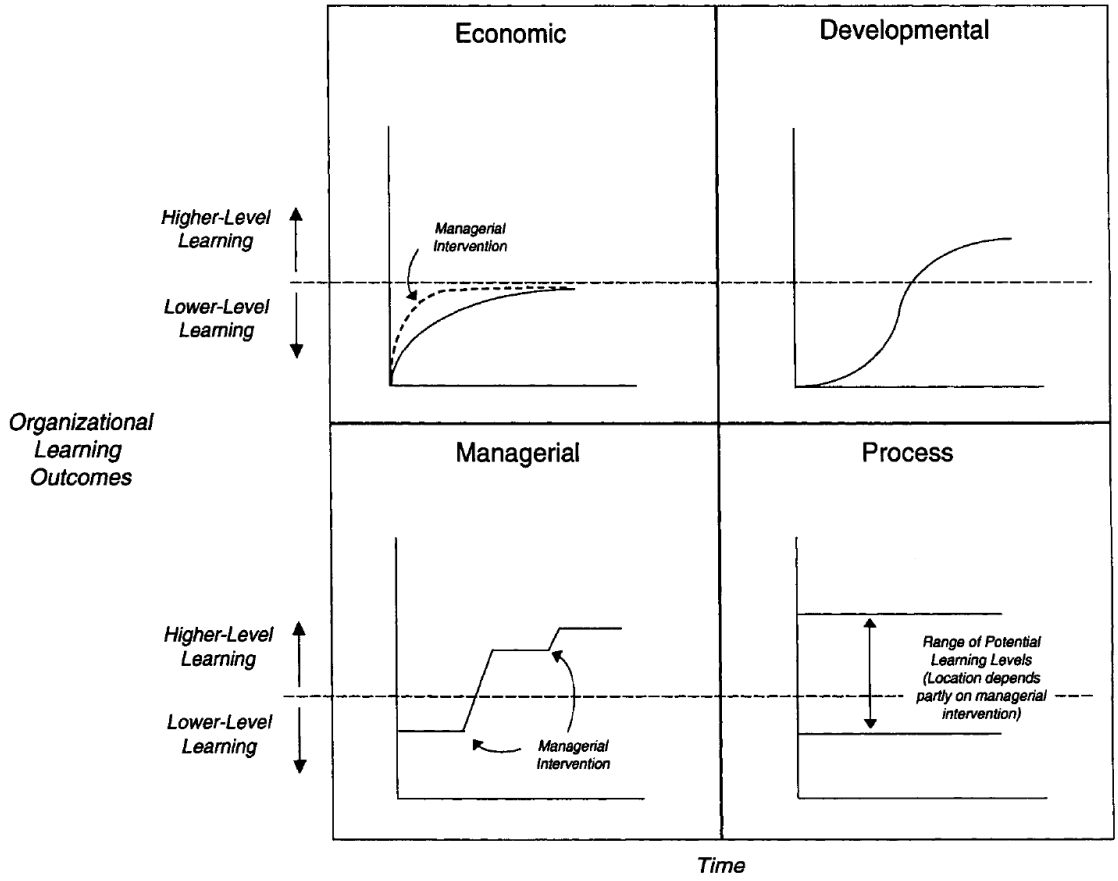
The focus of the *developmental school* (learning by evolution) is on higher order learning and the stages that should be followed to achieve such learning. Each stage of the education experience represents an incremental development of individual learning and organisational capability. Learning proceeds in a series of interlinked sequences that provide the necessary foundation for moving to each successive stage (Bell et al., 2002).

The *managerial school* (learning by management-led change) also focuses on higher order learning, but it does not see the achievement of such learning as having to progress through a hierarchical sequence. Instead, the key to achieving higher order learning is for managers to follow a set of prescriptive guidelines to change the organisation's culture. According to Kululanga et al. (2001, p. 23), this reactionary and interventionist approach to organisational learning may be described as "forced organisational learning". The challenge for managers is to generate steeper learning curves. The nature and extent of organisational change are the

keys to how quickly and fully higher order learning is unleashed. Senge (1990) adopted a managerial view, where organisational learning is a matter of introducing a systemic combination of values and norms, referred to as learning disciplines.

The focus of the *process school* (learning by information processing) concerns all forms of learning, be it lower order or higher order, particularly on the fundamental processes that underpin learning, regardless of nature and style. Organisational learning is conceptualised in terms of the processes of information acquisition, dissemination and utilisation, as well as the encoding and retrieval of memory. In construction, this could be reflective of application of intranets (organisation and project-based), project planning, scheduling and formal meetings. It could be argued that the process school of organisational learning is in essence a knowledge management and communication exercise (Tennant and Fernie, 2013).

Figure 4-6 shows the differences between the four schools. It provides a graphic representation of the pattern and learning outcomes characteristic of each of the four schools.



Source: Bell et al. (2002)
Figure 4-6: Organisational learning schools

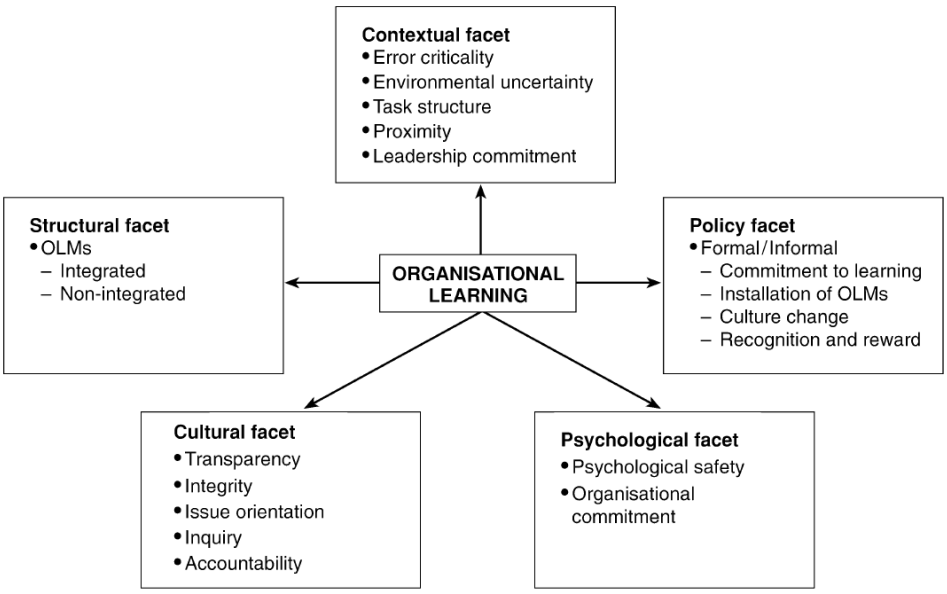
The real challenge to the field of organisational learning is in practice not to choose one belief system over another but to employ all four schools effectively. However, their fundamentally different theoretical heritages do not imply that organisational learning scholars should attempt to synthesise the existing schools of thought (Bell et al., 2002). The theoretic plurality of looking

at the four perspectives together gives a more holistic understanding of organisational learning in construction, both in theory and in practice (casus-oriented), than by any view in isolation.

In summary, these schools of thought in organisational learning represent a pragmatic and holistic framework for the exploration of organisational learning in construction supply chains.

4.9.2 Multifaceted model of organisational learning

Chan et al. (2005) propose adopting a multifaceted model of organisational learning put forward by Lipshitz et al. (2002) to establish empirical evidence of organisational learning in construction projects. The model has five facets: contextual, policy, psychological, cultural and structural. According to Chan et al. (2005), however, the model should be understood and criticised as five different attributes rather than a process with links in between, as shown in Figure 4-7.



OLM = Organisational Learning Mechanism

Source: Chan et al. (2005)

Figure 4-7: Multifaceted model of organisational learning

4.9.3 Communities of practice and social learning systems

Chan et al. (2005) question whether organisational learning is sustainable from a project perspective, or would the case be that projects become 'learned' organisations, rather than 'learning organisations'? Projects could be set up as 'learning networks', similar to that of a community of practice by Wenger (2000). Wenger argues that the success of organisations depends on their ability to design themselves as social learning systems and also to participate in broader learning systems such as an industry, a region, or a consortium.

Since the beginning of history, human beings have formed communities to share the cultural practices reflecting their collective learning. Wenger defines communities of practice as: *"the building blocks of a social learning system because they are the social 'containers' of the*

competences that make up a system" (Wenger, 2000, p. 229). Competences are defined by combining three different elements (Wenger, 1998). First, members are bound together by their collectively developed understanding of what their community is about and they hold each other accountable to this sense of joint enterprise. To be competent is to understand the enterprise well enough to be able to contribute to it. Second, members build their community through mutual engagement. To be competent is to be able to engage with the community and be trusted as a partner in these interactions. Third, communities of practice have shared communal resources. To be competent is to have access to this repository and be able to use it appropriately.

The notion of 'communities of practice' started to arise in the 1990s and early 2000s (Brown and Duguid, 1991; Lesser and Storck, 2001). They have proven to be successful in terms of improving the performance of organisations as diverse as international banks, major car manufacturers and government departments, as described by Wenger and Snyder (2000). Communities of practice differ from other forms of organisation in several ways, such as formal working groups, project teams and informal networks. This is displayed in Table 4-2.

Title	What is the purpose?	Who belongs?	What holds it together?	How long does it last?
Community of practice	To develop members' capabilities; to build and exchange knowledge	Members who select themselves	Passion, commitment and identification with the group's expertise	As long as there is interest in maintaining the group
Formal work group	To deliver a project or service	Everyone who reports to the group's manager	Job requirements and common goals	Until the next reorganisation
Project team	To accomplish a specified task	Employees assigned by senior management	The project's milestones and goals	Until the project has been completed
Informal network	To collect and pass on business information	Friends and business acquaintances	Mutual needs	As long as people have a reason to connect

Source: Wenger and Snyder (2000)
Table 4-2: Comparison of 'communities of practice' against other organisation forms

A systematic study of the linkage between community outcomes and the underlying social mechanisms that are at work was conducted by Lesser and Storck (2001). They argue that the social capital resident in communities of practice leads to behavioural changes, which in turn positively influence business performance. The authors identify four specific performance outcomes associated with the communities of practice they studied and linked these outcomes to the basic dimensions of social capital. These dimensions include: (1) connections among practitioners who may or may not be co-located, (2) relationships that build a sense of trust and mutual obligation, (3) a common language, and (4) context that can be shared by community members.

4.10 Identifying the gap in theory

Why is research needed on strategic PPP procurement systems, and why is it needed now? The type of PPP examined in this thesis is a complex hybrid comprising multiple parties

delivering potentially multiple projects. The PPP is established through a set of contracts that establishes a business-to-business environment where complex performance of the product or service delivered is reflected in the way the various organisations involved are able to work together and, over time, are expected to learn collectively. This collective learning is supported by the fact that the public policy intentions for partnership forms of working and supporting regulations are clear in the policy-level statements that preceded the use of PPPs.

From the early 1990s, the UK government recognised the option and possible advantage of involving the private sector in the delivery of public services. This introduced the notion of working in 'partnership' and this recognised the long-term and significant level of interaction needed to ensure success. For this form of partnership working to be successful, there is the implicit need for effective contracts to be put in place to act as the foundation for what will then happen, but a partnership will only work well if the parties to the partnership accept the need to find optimal ways of working together, both to allow the contract to be enacted and to deal with the many situations that the contract will be silent on, but which need to be addressed. This all implies a clear need for the parties involved to learn. The novel and unique contribution made by this thesis is the exploration of how the parties to this complex form of PPP learn collectively.

This focus on collective learning in strategic PPP procurement systems distinguishes this thesis from previous studies, such as the learning framework for successful cooperative strategic partnerships (Morrison and Mezentseff, 1997), the learning model for construction alliances (Love et al., 2002), the continuous improvement model (Cheng et al., 2004), the revised TQM framework (Oakland, 2014; Oakland and Marosszeky, 2006) and the project capability model (Brady and Davies, 2004). The strategy for this type of procurement system is to develop, deliver and maintain assets to which complex performance can be derived.

Noting the above, the starting position for this research was the empirical evidence based on the live experience from a previous government's BSF policy. However, whereas the principle of PPPs may have presumed a spirit of learning collectively through time, in BSF the explicit requirement or even the need for organisations involved to learn seems to be poorly and ill-defined in the standard policy documentation and, it would appear, not foreseen as an important issue.

In this case, the BSF policy intention was to build schools that demonstrated both high levels of VfM and environmental sustainability. The policy was set up by PfS and rolled out through LEPs as the recommended PPP delivery vehicle. When various organisations from both the public and private sector involved in LEPs work with the detailed policy and contract mechanisms, it generates results in terms of output performance of the constructed or refurbished assets (either positive or negative in terms of VfM and environmental sustainability outputs) as well as opportunities for learning (specific individual and collective learning points). This introduces the temporal and geographical nature of LEPs as location- and project-based

organisations, which may cause a limitation of distilling any knowledge that is accumulated in the course of a project. This knowledge could be at risk of being assigned to a different task, another team or a new deadline (Defillippi and Arthur, 1998). Despite the difficulties of project-based learning, several studies have shown that firms do achieve organisational learning through projects (Prencipe and Tell, 2001) and that performance in integrated projects depends on how quickly and successfully PPP firms can learn and find repeatable solutions (Davies and Brady, 2000). Ruuska and Brady (2011) argue that the effectiveness of the replication strategy in complex investment projects needs to be studied in greater detail.

Because of this consideration, a simple and obvious question arises: how can organisational learning take place in strategic PPP procurement systems, and why is it important for the key parties involved to learn collectively? This thesis explores this question.

How learning can manifest itself in permanent construction organisations has been well researched by scholars (Argyris and Schön, 1978; Bell et al., 2002; Dodgson, 1993; Field and Ford, 1995; Kupers, 2012; Levitt and March, 1988; Loch and Morris, 2002; Wang and Ahmed, 2002). How learning can take place in TOs that are often seen in the construction sector has also been widely explored (Barlow and Jashapara, 1998; Chan et al., 2005; Cross and Israelit, 2000; Kululanga et al., 2001; Loch and Morris, 2002; McCann, 2011; Schwab and Miner, 2011; Tennant and Fernie, 2013). However, what is lacking is a common understanding of how this learning occurs in a complex hybrid form of organisation, one where multiple permanent public and private sector organisations are working together strategically to form new long-term TOs on a repeating basis. This organisational and procurement phenomenon has occurred at scale in the UK where strategic PPPs such as LEP, LIFT or hub companies are created to develop, deliver and operate long-term capital projects. This research tries to understand how learning can take place in this specific hybrid organisational structure. It is a relatively rare and complex organisation type that can be proposed by governments to attempt to procure projects in a more systematic way instead of piecemeal, and taking a whole-life value approach to projects.

The organisational learning literature has already reached a degree of agreement that contracts cannot, even in much simpler contractual arrangements, hope to cover all eventualities and circumstances (Dyer and Singh, 1998; Poppo and Zenger, 2002). This research therefore seeks to make a real and timely contribution to the emerging debate on the systematic way in which organisations involved in strategic PPP procurement systems can learn collectively and how this affects their performance. In order to address the phenomenon of collective learning within a hybrid of permanent and temporary organisations, ancillary theories are further explored and debated in chapter 7 including principles of systems thinking, organisational learning, procuring complex performance and project-based learning.

4.11 Summary of chapter 4

The objective of this chapter was to set out and discuss existing theories of organisational and collective learning within management sciences. Having explored various definitions, with the support of two learning archetypes in section 4.2, the chapter moved on to further delve into the archetype that addresses root causes of performance problems of companies. This covers double-loop learning, deutero-learning, team learning, learning disciplines, systems thinking and handling learning disabilities. The notion of systems thinking is explored in detail as it seeks to address a recurring theme in this research, namely that of dealing with complexity in organisations. The tools that come with the circular pattern of systems thinking can be applied in most circumstances and management situations. There are a couple of distinctions: that of detail complexity and dynamic complexity. Systems thinking is a conceptual framework with tools helping to see the whole rather than the sum of its parts. It also helps to see circular interrelationships rather than linear cause/effect chains, and to see processes of change rather than snapshots. Some other concepts of learning are discussed as part of Senge's philosophy of learning disciplines, such as adaptive learning, survival learning and generative learning. Feedback is an essential part of systems thinking. It can be reinforcing (or amplifying) and balancing (stabilising) feedback. Another essential aspect is that of continuous collective learning as it not only helps organisations improve their intrinsic performance (section 4.4 and 4.9.1), but also the way in which the learning capacity is applied and adhered to (at individual, collective and organisational level) is critical to enhanced customer relationships as a basis for better economic performance. The ability of a project team to learn collectively is paramount for improved productivity and performance.

While this chapter sought to establish a deeper understanding of theories in organisational learning and collective learning, there is a need to contextualise the construction sector and those organisations responsible for different project goals and objectives. In particular, in the context of social infrastructure capital at authority level, it may not be just a case of introducing new processes and systems, but instead require reviewing and amending the existing processes to reflect requirements for learning collectively (McCann, 2011). Risk management systems and methods could be improved through sharing expertise and designing enhanced ways to promote more effective risk management that embeds continuous learning (Marsh, 2011). Events can be analysed and lessons learned from previous successes or failures to prevent or reduce the chance of similar risks recurring for the benefit of enhanced service delivery and achieving better VfM. In this context, it is interesting to consider the following central research question:

How can collective learning take place effectively for organisations collaborating in possible future strategic PPP procurement systems from the case of LEPs?

The next chapter will turn to the research design, setting out the philosophical approaches (epistemology, ontology and axiology) with their reasoning, and the research strategy that must be followed to answer the research objectives and questions raised in chapters 1 to 4.

Chapter 5 – Research design

5.1 Overview

The aim of this chapter is to draw out the design of the research by exploring the philosophical and analytical positions taken, and to set out the strategy in the creation of new knowledge from empirical analysis of existing literature, science and data available. The research design also sets out how a conceptual learning framework for strategic partnering in construction is developed, tested, implemented and validated. The research methods and tools to be utilised for collecting and analysing empirical material are described and explained in chapter 6.

Different research paradigms are considered, followed by a discussion on the philosophical stances and approaches adopted for this study. This guides the analytical approaches on how data was gathered and analysed, findings were generated and conclusions were drawn. In the last section, the research strategy is provided that sets the outline of the plan that was followed to answer the research objectives and questions, including the process for the development of a conceptual learning framework for strategic partnering in construction.

5.2 Research paradigms

According to Bryman (1988, p. 4), a research paradigm can be defined as *"a cluster of beliefs and dictates which for scientists in particular disciplines influence what should be studied [and] how research should be done, how results should be interpreted, and so on"*. A research paradigm encompasses the ontological and epistemological foundations and assumptions that govern a particular study (Guba, 1990). These, in turn, influence the research methods used to investigate a problem and to collect, analyse and interpret data (Dainty, 2008). Taking the view that research methods and paradigms are interrelated will *"enable philosophical differences in the role that theory plays in research to be viewed through the lens of methods employed by researchers"* (Dainty, 2008, p.4).

The philosophical approaches are discussed in **Appendix H**. An exhaustive summary of the various research paradigms identified by Wright (2011) is set out in Table 5-1. Familiarising oneself with the intricacies and details of Table 5-1 has been vitally important when thinking pre-emptively and retrospectively about the research study's method to be covered later in chapter 7. Table 5-1 represents the culmination of thinking around the topic of knowledge creation as demonstrated by the range of peer-reviewed publications cited: Bond (2009); Cherryholmes (1992); Cherryholmes (1994); Cook and Campbell (1979); Denscombe (2007); Denzin and Lincoln (2011); Durkheim and Allcock (1983); Grbich (2007); Guba (1990); Howe (1988); Lincoln and Guba (1985); Lincoln et al. (2011); Mertens (2007); Mertens (2014); Miles and Huberman (1994); Shadish et al. (2002); Tashakkori (2003); Tashakkori and Teddlie (1998); Teddlie and Tashakkori (2009); Weber (1949).

This research addresses scholars in management sciences, especially those researching topics associated with organisational learning, through the philosophical lens of pragmatism. This is shown in Table 5-1 with a column shaded grey. The underlying motives are associated with the lack of clarity about the systematic way in which organisations involved in strategic temporary PPP procurement systems can learn collectively and how this affects their performance. The focus of this PhD research is on the notion of collective learning within such procurement systems for social infrastructure, based on long-term collaboration or cooperation and engagement. Various collective viewpoints are considered from organisations involved in these PPP structures (LEPs) about contractual and behavioural aspects, as well as the products and services produced (schools). The challenge has been to justify the decisions taken in relation to the interview survey activities and the various types of secondary asset-level data to be included as part of a holistic approach. As such, it can be argued that while the philosophical background of this research is diverse and broad (climate change and PPP procurement of social infrastructure), the main academic focus is on collective learning by those organisations (not the individuals) participating in the strategic PPP procurement system itself and also in the assets it produces. The collective learning observed in such temporary organisations is considered to be a specified form of organisational learning.

Design of the research

Striking a balance between both positivist and constructivist paradigms has therefore called for a more flexible approach. In terms of addressing the two quantitative research questions proposed, pertaining to the assets, a more conventional positivist mentality was applied. For the qualitative questions pertaining to the organisations, a more constructivist paradigm was needed due to the extraction of knowledge of a policy (BSF) that was subject to societal criticism. Thus, the totality of the project's research design could be described as a mixture of techniques and philosophies used in a pragmatic way to extend knowledge through the convergence of both qualitative and quantitative data. Pragmatism can be defined as: *"a worldview supporting the selection of appropriate research methods in relation to the research questions being studied. Researchers may choose to use a quantitative method or a qualitative method, or to conduct a mixed methods study using both kinds of methods, all depending on which choice best befits the research questions"* (Yin, 2010, p. 311).

The philosophical assumptions that are considered in this study are how the researcher knows what is known (epistemology), the researcher's stance towards the nature and existence of reality (ontology), and the role of the researcher's values in designing and conducting the research (axiology). For each of these, **Appendix H** sets out to explain philosophical positions and reasoning for this research study, arguments as to why it is important and what it delivers.

Based on **Appendix H**, Table 5-1 is annotated (in blue) to show what principal philosophies and major characteristics were used in a pragmatic way for this research, and how and why the pragmatic approach relates from an epistemological, ontological and axiological contrast.

Dimension of contrast	Constructivism	Transformative	Pragmatism	Positivism	Post-positivism
Principal philosophy	- Reality is viewed socially and societally embedded and existing within the mind. - There is no objective knowledge. - Knowledge is constructed jointly with researcher and researched via consensus.	- Primarily used to address issues for oppressed groups, inequality and social injustice using culturally competent mixed methods strategies. - Recognises that realities are constructed and shaped by social, political, cultural, economic, and racial/ethnic values.	- Agrees with positivist and post-positivist stance on the existence of external reality. - Does not believe that truth regarding reality can actually be determined. - Unsure that any one explanation is better than any other. - There is no single best scientific method that can be indisputable knowledge.	- Views truths as absolute and values the original and unique aspects of scientific research i.e. realistic descriptions. - Truthful depictions, studies with clear aims, objectives and properly measured outcomes.	- Considers that research is influenced by the theoretical framework employed. - Questions the ability to prove a theory or causal proposition. - A number of theories can account for a body of evidence. - Recognises the value-ladenness of facts and the potential influence the researcher can have.
Major characteristics	- Exploration of the way people interpret and make sense of their experiences. - Identification of how the contexts of events and situations impact on constructed understanding.	- Qualitative dimension is needed to gather community perspectives. - Quantitative dimension can demonstrate outcomes that have credibility for community members. - Seen as a mechanism for addressing the complexities of research in culturally complex settings.	- Regard knowledge as being based on practical outcomes and 'what works'. - Knowledge is provisional in that what is regarded as truth today may not be so in the future. - Rejection of immovable distinctions such as facts vs values, objectivism vs subjectivism, rationalism vs empiricism. - Seeking absolute truth is not an objective.	- Knowledge is viewed as being able to be deduced from careful hypothesis design. - Domain features are dominated by regularity. - Believe that everything is caused by something. - Statistical analysis deemed to be able to discover facts.	- A paradigm which is seen to replace the more extreme facets of positivism. - Seen as the intellectual heir to positivism. - Still bound to the quantitative vision of science. - Acceptance of the view that researchers of any leaning, qualitative or quantitative, are prone to constructing their own view of social reality.
Methods	- Qualitative.	- Both qualitative and quantitative. - Community of participants involved in methods decisions.	- Both qualitative and quantitative. - Researchers answer questions using best methods.	- Quantitative.	- Primarily quantitative.
Logic	- Inductive: observation is used to build theory.	- Inductive and deductive.	- Abductive: best prediction of what may be true from incomplete observations.	- Deductive: previously formed theory is tested.	- Deductive.
Epistemology	- Interpretivist point of view. - Sense of reality built with participants.	- Objectivity and interaction with participants valued by researchers.	- Objective and subjective points of view sought, depending on stage of research.	- Objective point of view.	- Modified dualism (either/or choices).
Philosophical stance of undertaken research	**- Interpretivism relates to subjective nature of 69 interviews with better- vs worse-performing LEPs.**	**- Interactive dialogue and interpretation of perception from LEP participants.**	**- Logic of the main argument is neither deductive nor inductive.** **- Both qualitative and quantitative data.**	**- Positivism relates to more objective multi-criteria analyses of 600 LEP-built schools.** **- Build a framework on existing theories.**	**- The research is influenced by the theoretical framework employed.**
Ontology	- Multiple constructed realities (subjectivism).	- Diverse viewpoints regarding social realities. - Explanations that promote social justice.	- Diverse viewpoints accommodated. - Best explanations within personal value systems.	- Naive realism. - Objective external reality that can be comprehended.	- Critical realism. - External reality is understood perfectly and probabilistically.
Philosophical stance of undertaken research	**- Reality is viewed as a result of human perception about LEPs which are the social phenomena under investigation.**	**- Development of a conceptual learning framework where perspectives from various actors cannot be seen objectively.**	**- Findings are empirical (not normative), whereby objective and subjective views are sought and related to one another.**	**- If the researcher has control over events involved, then quantitative approaches are preferred.**	**- The reality that BSF was cancelled was taken into account by collecting the data prior to theoretical model development.**
Axiology	- Value-laden inquiry.	- Value inquiry.	- Value important in interpreting results.	- Value-free inquiry.	- Value in inquiry but their influence may be controlled.
Philosophical stance of undertaken research	**- Objectivity of the researcher might be impaired or biased due to influence of the researcher on actual policy delivery.**	**- The researcher had sufficient level of expertise about and professional engagement in the legacy BSF policy prior to the start of the research study in 2010.**	**- Clarity is given about the researcher's personal values, ethics, confidentiality, politics and bias in section 11.9.**	**- This axiological stance did not occur during the undertaken research study.**	**- The objective position of the researcher in both the school- and LEP-level analyses was controlled by the methods adopted.**
Causal linkages	- All entities are simultaneously shaping each other. - Impossible to distinguish between causes and effects.	- Causal relationships may exist but these need to be understood within the framework of the research.	- Causal relationships may exist but these are transitory and hard to identify.	- Real causes occur before or simultaneously with effects.	- Cause identifiable in a probabilistic sense that changes as more predictors are identified.
Generalisation	- Believe that only time- and context-bound ideographic statements are possible. - Emphasises the importance of transferability of results from one setting to another.	- Emphasises ideographic statements. - Willing to link results from a specific study, often a single case study, and applies that to broader issues.	- Emphasises ideographic statements but not to the exclusion of other viewpoints. - Frequently carried out as a single case study which can become an exemplar for others.	- Believe that time- and context-free generalisations are possible. - Total belief and utter confidence that the numbers speak for themselves. - Extrapolation of findings to assume representation of a much larger population are typical.	- Accepts measures that are observed from a relatively large sample to give a general outlook. - Willing to recognise caveats.

Table 5-1: Paradigm contrast table

5.3 Research strategy

The next part of the research design aims to clarify what research activities took place to address each of the research objectives and research questions. A detailed research strategy flowchart in **Appendix I** summarises the following information: (1) the research problem area; (2) the research objectives and questions; (3) the conceptual design that translates the BSF policy into practice; (4) the analytical learning framework called AVEM to be introduced in chapter 7; (5) data collection and analysis strategies for both asset-level data and organisation-level data; and (6) a breakdown of the chapters for this thesis.

The remainder of this thesis is structured around each of the two research objectives (section 1.3 refers) and five research questions (raised at the end of chapters 2, 3 and 4). The reason for this is to maintain a focus on the central argument: how can collective learning take place effectively for those organisations collaborating in possible future strategic PPP procurement systems? The research objectives are repeated here:

Research objective 1 – Asset level:
To understand what the client's key asset performance criteria are in projects delivered by strategic partnership procurement systems, and explore how these requirements are appraised empirically for these joint ventures to deliver whole-life VfM and environmentally sustainable buildings.

Research objective 2 – Organisation level:
To explore how key contract mechanisms are being judged by the participants in strategic partnership procurement systems, and to evaluate what their collective learning observations are, to be able to meet clients' expectations related to the achievement of whole-life VfM and environmental sustainability criteria agreed on projects.

The above research objectives are operationalised by four research questions and guided by a central research question, to investigate the development of BSF schools and their LEPs. Looking at the detailed research strategy flowchart in **Appendix I**, the analytical framework is relevant at both asset level (Objective 1) and organisation level (Objective 2), hence the order of research questions and objectives is as illustrated in Figure 5-1.

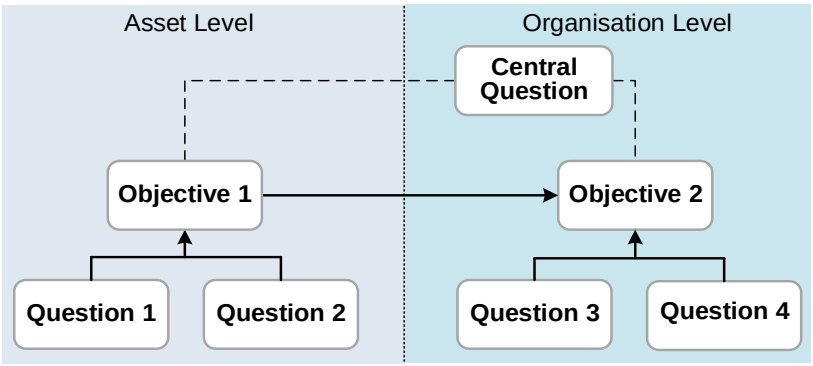


Figure 5-1: Primary research routing

The central research question posed at the end of chapter 4:

How can collective learning take place effectively for organisations collaborating in possible future strategic PPP procurement systems from the case of LEPs?

The research questions explained at the end of chapters 2 and 3 are repeated here:

1. **How do VfM and environmental sustainability considerations impact on the design, build, maintenance and operation of social infrastructure (LEP-built schools)?**
2. **How can strategic partnership procurement systems (LEPs) be organised to deliver social infrastructure (schools) when requiring them to be both VfM and environmentally sustainable during the whole asset life?**
3. **How do you effectively measure and manage performance of a strategic partnership procurement system (a LEP) for social infrastructure?**
4. **How can key contract performance requirements established by a client (a LA) and its strategic partnership procurement system (a LEP) be measured and managed effectively to ensure whole-life VfM and sustainability targets can be delivered?**

Answering the above questions ultimately allows a discussion on theories underpinning findings and outcomes concerning learning in and by organisations collaborating/cooperating in strategic PPP procurement systems for social infrastructure. The research questions follow a non-experimental fixed strategy (e.g. closed survey questions) as opposed to an experimental flexible strategy, although the 'How'-type research questions and objectives suggest the need for a flexible design.

The outputs of objective 1 (asset level) are needed to deliver objective 2 (organisation level), via question 1 and question 2. Outputs generated from objective 2 utilise both the data from question 3 and question 4 (judgement about the effectiveness of the contract mechanisms in the SPA), and objective 1 (appraising operational performance of assets delivered by LEPs) to enable organisational learning to be articulated in response to the central research question, using the analytical learning framework developed in chapter 7. The research objectives have a 'What' element, which suggests the use of a non-experimental fixed strategy (e.g. surveys). They also have a 'How' element, which indicates a flexible design involving a combination of qualitative and quantitative data. The essence is that fulfilling both research objectives will lead to a rounded answer to the central research question by using a model that can identify specific opportunities to learning, any collective learning points, and any considerations from organisations that learn over time in strategic PPP procurement systems for social infrastructure. Detailed strategies of how to address key aspects of each research question are provided in section 6.4.

The empirical research activities provided in **Appendix I** occurred in a specific order to be able to fulfil all the theoretical, quantitative and qualitative parts within the time constraints available. The research consisted of three phases as illustrated in Figure 5-2 and summarised below.

The chronology of the actual activities is different from the chapter sequence of this thesis. The main disparity between the reported and actual sequence of research activities is the fact that all data collection occurred prior to the development of a conceptual design for the research (refer to Figure 5-2). Due to the demise of BSF in 2010, the number of active LEPs in the market started to diminish from 2011. The researcher was aware of this at the time. Consequently, the LEP-level data collection was prioritised from 2012, followed by the school-level data collection from 2013. School-level appraisal analyses were completed in 2015, followed by the LEP-level evaluations in 2016. Both the appraisals and evaluations became the clue and initiators for the development of the analytical learning framework during 2015/16. Consequently, the data collection was prioritised at an early stage, with the only implication that more information was gathered than what was necessary to fit the theory. Data overload is a known phenomenon in qualitative research and will be debated further in section 6.7.3.

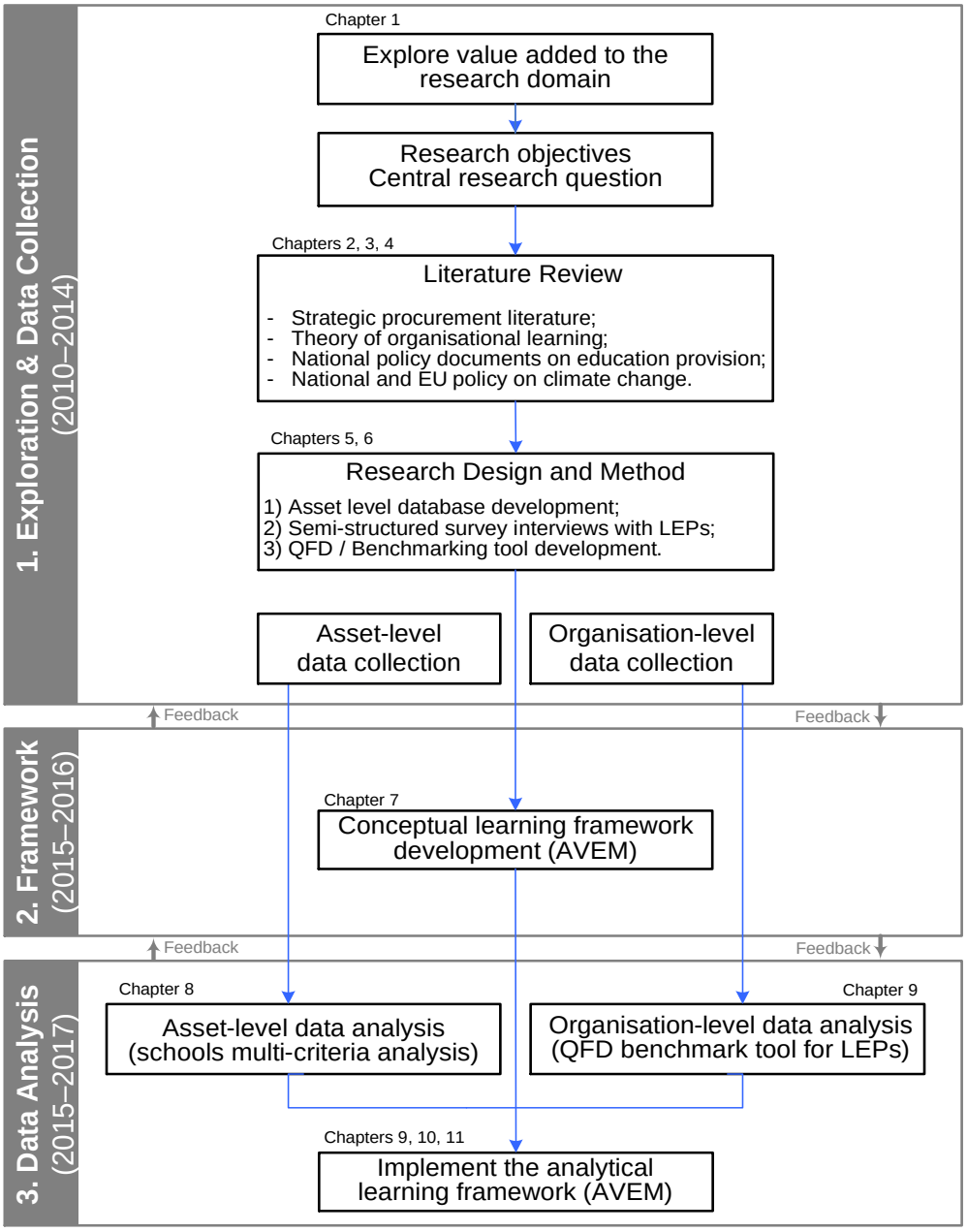


Figure 5-2: Chronological order of research activities

1. Exploration and data collection stage: The background and context was shaped from literature in order to articulate a robust problem definition. The aim was to produce a critical review of subjects as shown in Figure 5-2 to ultimately arrive at an in-depth understanding and debate of the literature. The second aim of this phase was the asset- and organisation-level data mining. Validating information from publicly and semi-publicly available datasets, a detailed interview survey protocol, and piloting of a semi-structured questionnaire design were needed before any data could be gathered. The methods for data collection are covered in chapter 6.

2. Framework design stage: A variety of theoretical lenses were explored to develop the AVEM as a conceptual learning framework that belongs predominantly to the domain of management sciences, especially that of collective learning and behaviour in temporary organisations. The AVEM' framework will emerge in chapter 7 to discuss how it fills the gap in theory articulated in section 4.10 and complement work by other scholars in the field. The framework was discussed and validated by a panel of experts following its implementation on BSF LEPs.

3. Data analysis stage: Both qualitative and quantitative data were analysed from modernised low-carbon LEP-built schools and appraised using MCA as a tool. Effectiveness of the LEP model itself was evaluated using QFD as a tool, based on the qualitative data following interview surveys, and structured around outputs achieved from more quantitative asset-level appraisals. Methods and tools used for data analysis are covered in chapter 6.

5.4 Summary of chapter 5

Having positioned the study by comparing and discussing a range of research paradigms in section 5.2, pragmatism appears to be a justified and most appropriate paradigm to approach the research objectives. A specific argument was put in favour of pragmatism by deeper review of the philosophical stances: epistemology, ontology, axiology. This chapter articulated the design of the research and its structure. It explains that the chronological sequence of research activities (Figure 5-2) is different to the order of this thesis (Figure 1-1).

The two research objectives are fulfilled by answering four formulated research questions. For question 4, however, the use of a conceptual framework will be needed. This needs to be developed in response to the central research question. Thus, the theories and tools of organisational learning and collective learning in chapter 4 will need to be expanded to the context of strategic partnering in construction, using the philosophical approach of pragmatism and a non-experimental fixed strategy with a flexible design for any 'How'-type questions.

Building on the complex procurement literature in chapter 3 and organisational learning literature accumulated in chapter 4, the following chapter will outline the research methods and tools used to collect the data and interpret findings, taking the case of BSF LEPs.

Chapter 6 – Research methods

6.1 Overview

This chapter discusses the research methods selected for this study. First the definition of methods versus methodologies and the different positions in quantitative and qualitative research are discussed. It is argued that mixed methods used in a pragmatic way are the most adequate tools to use for answering the research questions through the generation of both quantitative and qualitative data. Section 6.3 evaluates the mixed methods definition and approach, along with its benefits and limitations. Section 6.4 debates the apportioning of the research questions and the specific methodological approach needed for each question, so that they can be turned into separate but connected studies.

Section 6.5 brings further argument to the data sources at asset level: the various datasets utilised, input assumptions for cost benchmarks, sampling strategies and limitations. Section 6.6 summarises the data sources at organisation level, including an explanation of the entity types, sampling strategies and limitations. Section 6.7 covers the process of using semi-structured survey interviews for generating data adequately, with a reference to **Appendix J1** for a full summary of metadata collected. Section 6.8 considers three tools for analysing qualitative data generated from 69 semi-structured interviews with key participants involved in 12 LEPs. QFD is introduced in section 6.8 as a briefing tool, delivery tool and evaluation tool for the construction industry. This includes a step-by-step methodological approach to QFD for evaluating LEPs. Finally, section 6.9 highlights a number of practical constraints such as confidentiality of data, ethical considerations that were upheld throughout the study, and verification of data sources and validation of the data analysis.

6.2 Research methodologies versus research methods

Methodology refers to the systematic handling and procedures of the research and naturally flows from the researcher's position regarding ontology, epistemology and axiology (Ponterotto, 2005). The two dominant categorisations of research methodologies that derive from the philosophical positions discussed in chapter 5 are quantitative and qualitative research methods (Ponterotto, 2005) although mixed method strategies also exist (Creswell, 2014). These three broad strategies of inquiry are rooted in the objective and subjective ontologies as well as in positivist and interpretivist epistemologies. Quantitative research methods refer to research designs that employ numerical and objective measurements in addressing research questions and their solidness and robustness. This therefore aligns with deductive reasoning (Creswell, 2014), where there is a priori formulation of theories or hypotheses that are operationalised and subjected to rigorous empirical testing. Qualitative methods, however, refer to research designs that explore meaning and causal interaction through the use of textual rather than numeric data. Qualitative strategies align with inductive

reasoning where there is no a priori hypotheses to be tested empirically, as happens in deductive research (Creswell, 2014).

6.3 Understanding mixed methods

The research methodology selected is a mixed (or multiple) methods approach (Robson, 2002, p. 370). From the many academic essays which debate this topic, the recent popularity of mixed methods has been instrumental in developing what some academics (Armitage and Campus, 2007) refer to as the 'third way', which de facto is the integration of quantitative and qualitative data in one study. Mixed methods research is also referred to as the 'third methodological movement'. The approach can be useful for addressing different but complementary questions within the research. The complementary notion can be used to assess the threats regarding the validity of the primary research area. Each of the methods adopted for this research study is indicated within a blue box on the research strategy flowchart in **Appendix I**. One of the controversies about mixed methods is its wide variety of definitions:

Creswell and Plano Clark (2011, p. 5)	A research design with philosophical assumptions as well as methods of enquiry. As a methodology, it involves philosophical assumptions that guide the direction of the collection and the analysis and the mixture of qualitative and quantitative approaches in many phases of the research. As a method, it focuses on collecting, analysing, and mixing both quantitative and qualitative data in a single study or series of studies. Its central premise is that the use of quantitative and qualitative approaches, in combination, provides a better understanding of research problems than either approach alone.
Greene et al. (1989, p. 256)	Those that include at least one quantitative method (designed to collect numbers) and one qualitative method (designed to collect words), where neither type of method is inherently linked to any particular inquiry paradigm.
Johnson et al. (2007, p. 123)	Mixed methods research is the type of research in which a researcher or team of researchers combines elements of qualitative and quantitative research approaches (e.g. use of qualitative and quantitative viewpoints, data collection, analysis, inferences techniques) for the purposes of breadth and depth of understanding and corroboration.
Yin (2010, p. 310)	Deliberately designing a study to use quantitative and qualitative methods, both of which are needed to address the research question(s) of interest.

One common aspect is that in all definitions, both a quantitative and a qualitative element is included. Commentators on mixed methods have frequently attached pragmatism (see Table 5-1) as the most appropriate paradigm, suggesting how *" the exploratory inductive process that begins with empirical evidence of the particular ... proceeds to a level of abstracting, theorising, generalising and the confirmatory deductive process of hypothesis testing"* (Rocco

et al., 2003, p. 22). This study also relies heavily on an exploratory research approach to the subject of study. Robson (2002) classifies *exploratory* as follows:

- to find out what is happening, particularly in little-understood situations;
- to seek new insights;
- to ask questions;
- to assess phenomena in new light;
- to generate ideas and hypotheses for future research.

How this research study divides the qualitative and quantitative elements is articulated in Table 6-1, as adapted from Burns (2000, p. 391):

Qualitative	**Quantitative**
Assumptions	
Reality socially constructed	Facts and data have an objective reality
Variables complex and interwoven; difficult to measure	Variables need to be measured and their relation identified
Events viewed from informant's perspective	Events viewed from outsider's perspective
Dynamic quality to life	Static reality to life
Purpose	
Interpretation	Prediction
Contextualisation	Generalisation
Understanding the perspectives of others	Causal explanation
Method	
Data collection using semi-structured interviews with LEP participants	Testing and measuring school-level data
Concludes with hypothesis creation and/or grounded theory	Commences with hypothesis and theory
Emergence and portrayal	Manipulation and control
Inductive and naturalistic	Deductive and experimental
Data analysis by themes from informant's descriptions (QFD)	Statistical analysis (e.g. multi-criteria analyses, time series, compounded pivot tables)
Descriptive write-up	Abstract impersonal write-up
Role of researcher	
Researcher as instrument	Researcher applies formal instruments
Personal involvement	Detachment
Empathetic understanding	Objective

Source: adapted from Burns (2000, p. 391)
Table 6-1: Qualitative versus quantitative approaches

Rocco et al. (2003, p. 23) argue that by adopting a mixed methods research approach, the inherent flaws associated with both quantitative and qualitative elements are minimised because one method helps to offset weaknesses in the other:

- Quantitative research tends to be less helpful through its oversimplification of causal relationships;
- Qualitative research tends to be less helpful through its subjective selectivity in reporting.

Bryman (2007, p. 21) also points out some drawbacks of mixed methods: *"it could be argued that there is still considerable uncertainty concerning what it means to integrate findings in a mixed methods research project. The relative absence of well-known exemplars ... makes this exercise particularly difficult, as it means scholars have few guidelines upon which to draw..."* Appropriate use of mixed methods can therefore improve the reliability of research findings. Denzin (1989, p. 307) explains that, *"by combining multiple observers, theories, methods and data sources, [researchers] can hope to overcome the intrinsic bias that comes from single methods, single observer, and single theory studies"*. Greene et al. (1989) discuss five reasons to promote the adoption of mixed methods: triangulation, complementarity, development, initiation and expansion. The first three are most relevant to this research.

Triangulation: this is an approach used to confront the output of qualitative and quantitative methods on similarities and differences (Denzin, 1989). Data triangulation is the specific use of more than one method of data collection (quantitative and qualitative school-data analyses, qualitative LEP-level data analyses following semi-structured interviews and literature review).
Complementarity: Hesse-Biber (2010, p. 4) defines this as follows: *"allowing the researcher to gain a fuller understanding of the research problem and/or to clarify a given research result. This is accomplished by utilising both quantitative and qualitative data and not just the numerical or narrative explanation alone to understand the social story in its entirety."*
Development: mixed methods often aid in the development of a research study *"by creating a synergistic effect, whereby the results from one method ... help develop or inform the other method"* (Hesse-Biber, 2010, p. 5). The latter will appear in chapter 9, where the output of the asset-level data analyses becomes the input for the organisation-level analyses.

Bazeley (2004, p. 4) criticises the way triangulation has been misused for both purpose and design: *"while the use of parallel methods may not provide corroborative evidence, they may well add depth or breadth to a study and perhaps even hold the key to understanding the processes which are occurring"*. As such, this research has taken a more exploratory and inductive approach by adopting methods and techniques which complement one another in order to develop new perspectives, and to triangulate where possible between the LEP- and school-level analyses. Bryman (2007, p. 8) suggests, *"the key issue is whether in a mixed methods project, the end product is more than the sum of the individual quantitative and qualitative parts"*. Synthesising both quantitative and qualitative data in a research study to address the broader issues of collective learning in strategic PPP procurement systems for social infrastructure could benefit from more visual diagrammatic strategies. Miles and Huberman (1994) provide examples where a matrix is used to connect both ideographic and nomothetic conceptions. Bazeley (2004, p. 5) therefore suggests that *"mixed methods often combine nomothetic and idiographic approaches in an attempt to serve the dual purposes of generalisation and in-depth understanding – to gain an overview of social regularities from a large sample while understanding the other through detailed study of a smaller sample. Full integration of these approaches is difficult, hence the predominance of component studies."*

6.3.1 Quantitative research methods and approach

Quantitative research approaches focus on testing theories by examining the relationship between variables. There are two main quantitative research approaches – experiments and surveys – although according to Creswell (2014), there are also less vigorous experiments referred to as quasi-experiments. These research methods involve numbers and classes that are analysed using statistics (Runeson and Höst, 2008).

Experiments are investigations that seek to measure the effect of manipulating one variable against another variable in a controlled environment. To test causal relationships between variables, Cook and Campbell (1979) argue that experiments involve at least a treatment, an outcome measure, units of assignment and a form of comparison based on which change could potentially be attributed to the treatment. They also point out that pure experiments are characterised by the random assignment of treatment which is easier to achieve with objects in a laboratory than with humans in the field. Quasi-experiments are experiments that retain similar properties as true or pure experiments but where treatment for comparison is not randomly assigned. Stangor (2014) argues that the use of experiments in behavioural sciences are limited because of the difficulty manipulating conditions of interest when studying more social questions. Experiments were therefore not used for this research.

The main approach to quantitative methods for this research is the use of data gathered from *surveys* at both asset level (schools) and organisation level (LEP participants). The data from schools comprises predominantly numerical quantitative variables. Besides, most of the asset-level survey data is pre-populated in large data sets by third parties, and available in the public and semi-public domain. The data gathered from LEP participants is predominantly qualitative, except for those variables with ordinal answering categories which can be analysed using quantitative methods and tools. Surveys involve the assessment of thoughts, feelings and opinions through the administration of questionnaire instruments. Questionnaires are usually administered to a representative sample selected from a wider population although surveys can also be undertaken to collect information from everyone (Gomm, 2008).

The issue of statistical representativeness is a very important consideration in survey research (Gomm, 2008). The advantages of surveys are that they are relatively inexpensive in reaching a large number of respondents in different geographical areas, are more likely to produce honest responses due to anonymity of respondents and are less likely to be influenced by the characteristics of the researcher (Stangor, 2014). The downside, however, remains that surveys are often structured, cross-sectional and shallow in nature and therefore only suited for producing a ‘snapshot’ of opinions, attitudes or behaviours of a group of people at a specific point in time (Stangor, 2014).

6.3.2 Qualitative research methods and approach

Qualitative research methods are aimed at exploring the meanings that individuals attach to human or social problems. Qualitative methods involve data in the form of words, descriptions, pictures and diagrams, and data is primarily analysed through categorisation and sorting (Runeson and Höst, 2008). Five main qualitative research dimensions are considered by Creswell (2013) and shown in Table 6-2: narrative research, phenomenology, grounded theory research, ethnographic research and case study research.

Dimension	1. Narrative research	2. Phenomenology	3. Grounded theory	4. Ethnography	5. Case study
Focus	Exploring the life of an individual	Understanding essence of experiences about phenomena	Develop theory grounded in data from the field	Describe and interpret a cultural or social group	In-depth analysis of a single case or multiple cases
Disciplinary origin	Humanities, anthropology, literature	Philosophy, psychology, education	Sociology	Cultural anthropology, sociology	Political science, law, psychology, medicine
Unit of analysis	One or more individuals	Several individuals who have shared experience	A process, action or interaction involving many individuals	A group that shares the same culture	An event, activity programme, or more than one individual
Data collection	Interviews and documents	Interviews, documents, observations	Interviews with 20–60 individuals to saturate categories and detail a theory	Observations and interviews during extended fieldwork (e.g. 6–12 months)	Multiple sources including documents, interviews, artefacts
Data analysis	Analysing data for stories, themes development, chronology	Statements, meanings, themes, general descriptions	Open, axial, selective coding, conditional matrix	Description, analysis, interpretation	Description, themes, assertions
Narrative form	Detailed story of individual's life	Description of essence of experience	Theory or model	Description of cultural behaviour of a group or individual	In-depth study of case or cases

Source: Creswell (2013)
Table 6-2: Qualitative research dimensions

Each of these dimensions is discussed below, contextualised to this research study and reasoning as to why it has been applied, or not.

1. Narrative research

The emphasis is on capturing the lived experiences of an individual such as in biographical or autobiographical studies of individuals (Creswell, 2013). Andrews et al. (2013) point out that narratives can be event-centred and experience-centred. The researcher begins by identifying and selecting an individual who has a story or life experience that aligns with the question being explored, and collects information relating to the historical context of narrative stories such as culture, time and place of events. The stories are retold by the scholar in a narrative chronology using an appropriate framework. This dimension was not used for this research study as it is focused on seeking shared opinion from participants involved in the LEP as a collective of individuals, instead of building a narrative chronology of individuals separately.

2. Phenomenological research

The emphasis is on capturing the experience of a phenomenon by different individuals to identify what they share in common about the phenomenon they experienced (Creswell, 2013;

Robson, 2002). The aim is to gain deep information and perceptions of phenomena while refraining from any pre-given framework (Groenewald, 2004). Data is collected from participants who have live experiences of the phenomena being studied. In phenomenological research, the phenomenon dictates the method, e.g. sampling strategy, and not vice versa as that would otherwise constitute injustice to the integrity of the phenomenon (Hycner, 1985). The phenomenon analysed was the BSF policy with its LEPs and school infrastructure. The fact that BSF was cancelled in 2010 meant that the data required to answer the research questions could gradually disappear. Hence, for this research, taking a phenomenological approach is legitimate as the theoretical framework is developed after the data has been collected.

In a phenomenological approach to qualitative research, the importance of reflexivity needs to be stressed, i.e. awareness of ways in which the researcher as an individual with a particular social identity and background has an impact on the research process (Robson, 2002). Reflexivity will be debated further in section 11.9.

The qualitative approach for this research study involves methods of a phenomenological nature. The primary unit of analysis is made up of key participants involved in LEPs. By asking qualitative 'how' and 'why' questions and by applying triangulation with more quantitative 'what' and 'how many' questions, it becomes an example of executing case study research. However, the phenomena being studied are LEPs and data is collected as a sample of 12 LEPs (out of a population of 44). Such a wide and huge collection of data is too large for case studies. The sampling strategy (section 6.6.3 refers) is better suited for phenomenologically grounded methods.

3. Grounded theory research

Grounded theory is an alternative approach to deductive forms of theorising where theories are initially derived from the scholar's imagination before being subjected to any empirical research testing (Dey, 1999). Instead of theoretical orientation that stems from imagination, grounded theory scholars believe that theories should be 'grounded' in data from research participants. Glaser and Strauss (1967) therefore propose the grounded theory as a flexible method that allows for theory generation through constant interplay of data collection and analysis to ensure that theory is closely related to evidence before further research testing. Grounded theory is a method developed mainly for building theory from data (Corbin and Strauss, 2014). Rather than just building descriptions from the (LEP) participants as would be the case of narrative and phenomenological research, the scholar goes beyond descriptions to generate or discover new theory (Denzin and Lincoln, 2011). The grounded theory approach was not used for this research, because the participants are not theoretically sampled to ensure that a theory can be established based on the actions, interactions or processes that individuals engage in (Denzin and Lincoln, 2011; Martin and Turner, 1986).

4. Ethnographic research

In ethnographic research, the focus is on establishing shared patterns of values, behaviour or beliefs among a cultural group (Creswell, 2013). It involves extended observation of the group in their natural settings to ensure that the researcher is immersed in the day-to-day lives of participants. Ethnography was not adopted for this research because it would only be useful in circumstances where little is known about the beliefs, values or behaviours of a particular group, to establish a discernible pattern. It is longitudinal in nature, although contemporary ethnographers tend to work for shorter periods to uncover particular aspects of a culture group (LeCompte and Schensul, 2010). In the case of LEPs, a lot of this knowledge was available and accessible during the research study by conducting interview surveys.

5. Case study research

This is a method for empirically investigating a contemporary phenomenon within its real-life context using multiple sources of evidence (Runeson and Höst, 2008; Yin, 2009). Case study research has a peculiar advantage for instances where the boundaries between the concept being studied and its context are not entirely evident, and where questions of 'how' and 'why' are being asked about contemporary sets of events that the scholar has little or no control over (Yin, 2009). Opportunities to include multiple sources of evidence – triangulation – is also an advantage of case study research. However, the multiple sources of evidence (interviews, diaries, document analysis and observations) must be interwoven to arrive at a coherent narrative (Yin, 2009). No case study research was conducted because the asset- and organisation-level data analyses were separate exercises and not fully interwoven. The asset-level appraisals (partially qualitative but predominantly quantitative) involved a sample of 600 LEP-built schools, which is nearly the population of 700 LEP-built schools. The organisation-level evaluation involved a sample of 12 LEPs, representative of a population of 44 (or 27%).

6.4 Practical and methodological approach to research questions

Defining the research problem area and research objectives (see section 1.3) was constrained by a number of issues which resulted in the development of a more holistic and flexible research design and strategy (chapter 5). At the same time, scholars have expressed caution when selecting a research question which is arguably too general (Yin, 2009). Rather than focusing on a single, specific research question, the multiple methods approach is used for specific research questions in this study corresponding to Robson (2002, p. 371). For example, in a predominantly quantitative study, the interpretation of the statistical data may be enhanced by a qualitative study. The various ways in which qualitative and quantitative methods can be combined (Table 6-1) shows that no method or technique can exclude one another. The main disadvantage is that there is a possibility that the method produces conflicting results which need interpretation, in addition to the time and resources needed for each of the methods. Table 6-3 sets out the various methodological approaches for each of the research questions.

Research questions	Focus	Data collection method	Mixed analytical methods – adapted from Tashakkori and Teddlie (1998, pp. 128-135)	Methodological approach
Question 1: **How do VfM and environmental sustainability considerations impact on the design, build, maintenance and operation of social infrastructure (LEP-built schools)?**	▪ Inductive & deductive, ▪ Exploratory, ▪ Phenomenology, ▪ Predominantly quantitative.	▪ Using archival datasets, ▪ Reviewing literature. Asset-level data collection is discussed in section 6.5.	**Sequential analysis (quantitative appraisal first, then qualitative)** ▪ Using MCA of numerical data about individual assets, to explain their (high or low) net effect ratio scores. ▪ Using additional qualitative data about individual assets that perform extremely well or extremely poorly in a quantitative MCA, to explain their (high or low) frequency scores.	Descriptive statistics (frequency count, mean, variance and median) were performed for each single variable required to create asset value criteria for the appraisals in research question 1. Furthermore, with the use of a pivot table in standard Excel spreadsheet software, the number of schools were counted that fall within one LEP. LEPs with seven or more schools (or more than 50% of their portfolio) meeting an asset value criterion set for either VfM or environmental sustainability were selected for further organisational-level data analysis to support the answer to the central research question.
Question 2: **How can strategic partnership procurement systems (LEPs) be organised to deliver social infrastructure (schools) when requiring them to be both VfM and environmentally sustainable during the whole asset life?**	▪ Inductive & deductive, ▪ Exploratory, ▪ Phenomenology, ▪ Predominantly quantitative.	▪ Using archival datasets, ▪ Reviewing literature. Further detail about asset-level data collection is in section 6.5.	**Sequential analysis (quantitative appraisal first, then qualitative)** ▪ Using MCA of numerical data about individual assets, to explain their (high or low) net effect ratio scores. ▪ Using additional qualitative data about individual assets that perform extremely well or extremely poorly in a quantitative MCA, to explain their (high or low) frequency scores.	Descriptive statistics (frequency count, mean, variance and median) were performed for each single variable required to create asset value criteria for the appraisals in research question 2. Furthermore, with the use of a pivot table in standard Excel spreadsheet software, the number of schools were counted that fall within one LEP. LEPs with seven or more schools (or more than 50% of their portfolio) meeting the combined asset value criteria set for both VfM and environmental sustainability were selected for further organisational-level data analysis to support the answer to the central research question.
Question 3: **How do you effectively measure and manage performance of a strategic partnership procurement system (a LEP) for social infrastructure?**	▪ Inductive, ▪ Exploratory, ▪ Phenomenology, ▪ Predominantly qualitative.	▪ Conducting a survey, ▪ Semi-structured face-to-face interviews, ▪ Reviewing literature. Further detail about organisation-level data collection is in section 6.6.	**Qualitative evaluation using parallel mixed analysis** ▪ Using and analysing open-ended (qualitative) and closed-ended (quantitative) items as part of the same questionnaire. ▪ Transforming qualitative data into quantitative data through content analysis.	Each of the LEP contract mechanisms were investigated in further detail to explain the criteria that measure and ultimately underpin the delivery of best VfM and environmental sustainability agreed. This was achieved through document review and benchmarking interviews using a semi-structured questionnaire. Diagrams and schedules have been produced through statistical software SPSS and MS Excel. Documents reviewed are from organisations such as DfE, NAO, ICAS, KPMG, PAC and PwC who have previously ventured into this subject. Also from other sectors that have contributed to this research, such as LIFT for healthcare, and the hub initiative in Scotland.

Research questions	Focus	Data collection method	**Mixed analytical methods** – adapted from Tashakkori and Teddlie (1998, pp. 128-135)	Methodological approach
Question 4: **How can key contract performance requirements established by a client (a LA) and its strategic partnership procurement system (a LEP) be measured and managed effectively to ensure whole-life VfM and sustainability targets can be delivered?**	▪ Inductive & deductive, ▪ Exploratory, ▪ Phenomenology, ▪ Predominantly qualitative.	▪ Conducting a survey, ▪ Semi-structured face-to-face interviews, ▪ Reviewing literature. Organisation-level data collection is discussed in section 6.6. QFD as a data analysis tool is discussed in section 6.8.	**Sequential (quantitative first, then qualitative) analysis** ▪ Using additional qualitative data about individuals who performed extremely well or extremely poorly (outliers) in a quantitative analysis, to explain their (high or low) quantitative scores.	Most survey questions are closed-ended questions with answering categories on a five-point ordinal scale, followed by an open-ended 'why' question. Closed-ended questions were analysed using basic descriptive statistical analysis tools in SPSS, such as crosstabs, frequencies and in some cases compounded custom tables. Open-ended questions were analysed using NVIVO. The software enables coding and frequencies to be added against similar types of answers to open questions. In some cases, it was possible to build a matrix coding query that links the different answers to the ordinal answering categories of its aforementioned closed-ended question. The intended data analysis tool from the interview survey questionnaire comes from theory in TQM, called QFD. Derived from this theory is the 'asset value QFD' toolkit. The QFD method and software toolkit is explained in detail in section 6.8 and **Appendix L1**. The implementation is discussed in chapter 9, with reference to detailed screenshots and templates in **Appendix L5**. Diagrams and schedules were produced through multiple analytical software: MS Access, MS Excel, NVIVO, SPSS, MS Visio, Visual Basic.
Central research question: **How can collective learning take place effectively for organisations collaborating in possible future strategic PPP procurement systems from the case of LEPs?**	▪ Inductive, ▪ Exploratory, ▪ Phenomenology, ▪ Qualitative and Quantitative.	▪ Reviewing literature; ▪ Interpreting QFD assessment reports. The AVEM is introduced in chapter 7 and implemented with data from LEPs in chapter 9, with reference to fully worked output reports in **Appendix P**.	**Qualitative evaluation using parallel mixed analysis** (learning graphs) ▪ Using qualitative data to define learning in two groups, based on field observations of their instructional practices (qualitative), and then comparing QFD results (quantitative). ▪ The phenomenological approach justifies that it was appropriate (following the demise of BSF and the consequential 'drying up' of data) to gather the data in support of research questions 1 to 4 prior to the development and implementation of a theoretical framework.	Multiple theories are explored that fit this research theme in chapters 3 and 4. Chapter 4 also identifies the gap in theory and the need to focus on collective learning. The intended approach draws upon theories in organisational learning and quality aspects such as TQM, PDCA, continuous improvement and systems thinking. Chapter 7 explains in detail any relationships to explore the phenomenon of learning in strategic partnership procurement systems from a theoretical standpoint, and introduces the AVEM as a conceptual learning framework. The AVEM can be implemented by taking the case of LEPs in multiple 'better-performing' and 'worse-performing' scenarios. Using the AVEM on the data may explain the variable performance of LEPs (better versus worse) and may provide new insights on learning from overall performance. If the answer is that it can, but only partly, then other theories may be able to explain any gaps in knowledge.

Table 6-3: Methodological approach to research questions

6.5 Asset-level data collection

This section aims to bring further detail to the various asset-level data sources obtained. The following information is provided in the next sections: first, a breakdown of the sample size of 600 schools by name and type of school, investment type and procurement route; second, a summary table of the various data sources utilised; third, several input assumptions such as ratios and cost indices; fourth, an explanation of MCA as the main sampling strategy for asset-level data analyses; and finally, a number of important limitations about the data collection.

6.5.1 Breakdown of LEP-built schools from the datasets utilised

Under its original policy, BSF was to ultimately reach all LAs in England; however, only some 700 modernised low-carbon schools were developed and delivered by 44 LEPs between 2006 and 2014. In total, 600 were identified for further research using a base dataset of all England's education establishments, downloaded from the DfE EduBase2 website[26] on 20 June 2014. The LEP-built schools were identified by index-matching three other datasets against the base dataset: a list of 1,612 BSF schools confidentially received from the EFA in February 2013, a confidentially provided BSFI Information Memorandum of March 2011, setting out asset-level data in a report produced in support of a bid to sell the BSFI minority government stake to a private equity fund (BSFI, 2011), and a list of 1,500 BSF schools that was published online by DfE on 5 July 2010,[27] and later amended by the BBC.[28] Based on the BBC dataset, 859 schools received confirmation that they would still be subject to BSF funding as these are marked 'Open', 'Unaffected' or 'For Discussion'.

- Schools listed as 'Open' are those in which the procurement has delivered the planned new building, refurbishment, extension or ICT. For simplicity, 'Open' is used for all complete projects.
- Schools listed as 'Unaffected' are those which are within initial LEP or Academy Framework procurements and have reached FC, or are within a repeat wave of investment approved prior to 1 January 2010.
- Schools listed as 'For Discussion' are either: those which were 'sample' schools in projects which were at an advanced stage in the procurement process but had not yet reached FC, or academies where the building projects have not reached FC but are either already open, have a signed funding agreement, or are due to open in the next academic year.
- Schools listed as 'Stopped' are those that are within initial LEP procurements which had not yet reached FC, or are academy framework projects that had not achieved FC and where there is no funding agreement in place and the academy is not open or about to open, or which were to have been in a repeat wave of investment but which had not received approval prior to 1 January 2010.
- Schools listed as 'Closed' are all those that have closed or were due to be closed. These were included on the list because allocations of money were made under BSF to reflect the inclusion of these schools.

Source: BSF schools list, 19 July 2010[27]

The 44 LEPs were established to deliver a large proportion of these schools. The list contains 590 schools delivered by LEPs and 269 non-LEP schools delivered piecemeal or by contractor frameworks. During the research period, ten more LEP-built schools were identified. Hence,

[26] EduBase2 website: http://www.education.gov.uk/edubase/home.xhtml
[27] UK government website: http://media.education.gov.uk/assets/files/pdf/l/impact of building schools for the future announcement of Monday 5 july 2010.pdf
[28] BBC website: http://news.bbc.co.uk/1/shared/bsp/hi/pdfs/19_07_10_school_error_list.pdf

data has been gathered and analysed for 600 schools in total delivered through LEPs. Another 739 schools on the list (both LEP and non-LEP) are marked as 'Stopped', 'Closed' or 'Closing'. These schools never received BSF funding. The list contained about 30 errors which were acknowledged by DfE. On 19 July 2010, the DfE stated that the list *"has been produced by PfS after validation at senior level in LAs and rigorously checked by the DfE, including by making telephone contact with every LA listed and with all affected Academy sponsors"*. However, the BBC still found errors on the list. This then led to a sample size of 600 schools, as in Table 6-4, confirmed to have been built by BSF LEPs. The sample size represents a large majority proportion of a total population of some 700 LEP-built schools.

Total sample = 600	**New build**	**Part new build**	**Refurbishment**	**PFI**[29]	**Non-PFI**
Secondary	243	134	22	125	274
Primary	36	51	9	6	90
Nursery, PRU, SEN *	64	32	9	23	82
Total	**343**	**217**	**40**	**154**	**446**

* PRU = Pupil Referral Unit, SEN = Special Educational Needs

Table 6-4: Sample sizes by type of schools vs investment type and procurement route

Any BSF schools that were not delivered by LEPs but under separate D&B contracts or by framework agreements are not included in this study.

6.5.2 School-level data sources utilised

Both qualitative and quantitative data were gathered from the 600 modernised low-carbon schools (new build versus refurbishment, PFI versus non-PFI) delivered by 44 LEPs. The specific datasets and information sources called upon and acquired are in Table 6-5.

DATA SOURCES	**Schools cost performance data**	**Schools functional performance data**	**Schools environmental performance data**	**Other BSF school or LEP-specific data**
National public domain (online)	▪ HM Treasury PFI signed projects list (2014) ▪ 'FAME' financial data Companies House ▪ DfE CFR and SFR income/expenditure tables (2005/06–2014/15)*	▪ EduBase2 dataset ▪ Primary schools capacity data (DfE) ▪ Primary Basic Needs dataset (2013)	▪ DEC data (2008–2015) ▪ EPC data ▪ BREEAM dataset (BRE online)	▪ HM Treasury PFI signed projects list (2014) ▪ PfS BSF project supply chain list (2011) ▪ PfS schools capacity table (2010)
National semi-public domain (NDAs signed)	▪ EFA BSF schools capex data (2014)	▪ PfS School Building Survey 2007, 2009, 2011	▪ PfS School Building Survey 2007, 2009, 2011 ▪ DQIs (CIC, 2014)	▪ EFA BSF schools list (2010, 2012) ▪ Other BSF data (e.g. capex, opex, GIFA)
LAs	▪ PfS elemental benchmark data (PfS proforma)	▪ LA-generated school building survey data	▪ DQIs (on website) ▪ BREEAM data (on website)	▪ BSF info received ▪ SfC, OBC, FBC
LEPs (NDAs signed)	▪ PfS elemental benchmark data ▪ Lifecycle data	▪ KPIs, CITs ▪ Hard FM data ▪ Soft FM data	▪ Energy usage ▪ FM efficiency criteria	▪ List of LEP projects ▪ LEP performance reports ▪ LEP business plans
Individual schools	▪ Freedom of information data	▪ End-user comfort data	▪ School energy usage data (kWh) ▪ BREEAM data	▪ BSF info received

* CFR = Consistent Financial Reporting, SFR = Statistical First Release

Table 6-5: Key datasets and access levels

A detailed list of all datasets obtained in the public and semi-public domain is in **Appendix J2**.

[29] The PFI schools include seven refurbishments; the rest of the sample are all new build projects.

6.5.3 Input assumptions

A number of input assumptions are applied, each of which is discussed in the subsections below, with further detail in **Appendix J3**. To allow a comparison, any cost benchmarks have been set to a base date of July 2010 while controlling for location (London uplift versus the rest of England). Any cost data is indexed using Building Cost Information Service (BCIS), to the relevant base date as required (often contract award). A base date of July 2010 was chosen because it was also the time when the government announced that BSF would be cancelled. Besides, construction of the first school in the dataset started in July 2005 and the last school in July 2015. July 2010 approximately matches the midpoint of when capital was spent on the 600 LEP-built schools (using construction contract award start date as a proxy).

The following subsections will discuss: 1) various indices used for capital costs and operational cost; 2) cost benchmarks for new build school projects; 3) cost benchmarks for refurbishments and/or school extensions; and 4) operational cost benchmarks.

6.5.3.1 Indices for capital and operational costs

The following construction sector cost indices were collected from the BCIS website in 2015:

Series: **Base:** **Last updated:**	**General Building Cost Index** **1985 mean = 100** **Jan-2015** **Index**	**All-in Maintenance Cost Indices – General** **1st Qtr 1990 = 100** **Jan-2015** **Index**	**Energy Cost Indices – General** **1st Qtr 1990 = 100** **Feb-2015** **Index**
Jul-14	318	228.0	253.8
Jul-13	314	226.7	256.0
Jul-12	310	224.7	243.5
Jul-11	306	222.8	230.0
→ Jul-10	**295**	**217.5**	**208.3 ← selected base date**
Jul-09	285	212.8	212.3
Jul-08	282	207.9	216.8
Jul-07	267	200.9	176.3
Jul-06	255	194.7	176.8
Jul-05	241	185.7	145.5

Table 6-6: BCIS cost indexation table

The Retail Price Indexation (RPI) tables were only applied to the extended schools income and expenditure data. The RPI indexation table below was extracted on 19/10/2014 from the website www.ons.gov.uk/economy/inflationandpriceindices. Accordingly, RPIo is set at 223.6. Hence, based on RPIo at Base Date July 2010, the index ratios shown in Table 6-7 apply.

	RPI		**BCIS cost indices**			
Date	**Ratio RPIo**	**Ratio RPIn**	**Building cost**	**Energy cost**	**FM cost**	
Jul-14	256.0	0.87	0.93	0.95	0.82	
Jul-13	249.7	0.90	0.94	0.96	0.81	
Jul-12	242.1	0.92	0.95	0.97	0.86	
Jul-11	234.7	0.95	0.96	0.98	0.91	
→ Jul-10	**223.6**	**1.00**	**1.00**	**1.00**	**1.00**	**← selected base date**
Jul-09	213.4	1.05	1.04	1.02	0.98	
Jul-08	216.5	1.03	1.05	1.05	0.96	
Jul-07	206.1	1.08	1.10	1.08	1.18	
Jul-06	198.5	1.13	1.16	1.12	1.18	
Jul-05	192.2	1.16	1.22	1.17	1.43	

Table 6-7: BCIS cost indexation ratios table

6.5.3.2 Construction cost benchmarks for new build

Average construction cost benchmarks were extracted from Cabinet Office (2015, pp. 63-64). The average cost of an 8,000 to 10,000m^2 new build secondary school as part of the BSF programme was £2,158 per m^2 (at 2009/10 prices). The Cabinet Office worked with EFA- and BCIS-sourced data to undertake comparative £/m^2 analyses, as shown in Table 6-8 and Table 6-9, with average cost ranges, and highest (80th percentile) and lowest (20th percentile) cost ranges. The analyses by the Cabinet Office (2015) include the comparison of BSF schools with a range of other building types such as hotels, offices and local administration buildings. A further analysis by the Cabinet Office compared various types of schools ranging from secondary, 6th form, special, and BSF schools.

			BSF (2q 2009 prices)		
GIFA m2	Minimum GIFA m2	Maximum GIFA m2	Average	20th percentile	80th percentile
0-2000	0	2000	£2,851	£2,021	£3,712
2000-4000	2001	4000	£2,780	£1,999	£3,442
4000-6000	4001	6000	£2,566	£1,914	£3,033
6000-8000	6001	8000	£2,303	£2,132	£2,508
8000-10000	8001	10000	£2,158	£1,863	£2,403
10000-12000	10001	12000	£1,980	£1,837	£2,081
12000-14000	12001	14000	£1,899	£1,701	£2,017
14000-16000	14001	16000	£2,075	£1,845	£2,299
16000-18000	16001	18000	£1,962	£1,690	£2,180
18000-20000	18001	20000	£1,938	£1,786	£2,105
20000 +	20001	26000			

Source: Cabinet Office (2015)

Table 6-8: Schools construction cost benchmarks for DfE/EFA at Q2 2009

			BSF (2q 2010 prices)		
GIFA m2	Minimum GIFA m2	Maximum GIFA m2	Average	20th percentile	80th percentile
0-2000	0	2000	£2,994	£2,122	£3,898
2000-4000	2001	4000	£2,919	£2,099	£3,614
4000-6000	4001	6000	£2,695	£2,009	£3,185
6000-8000	6001	8000	£2,418	£2,239	£2,634
8000-10000	8001	10000	£2,266	£1,957	£2,524
10000-12000	10001	12000	£2,079	£1,929	£2,185
12000-14000	12001	14000	£1,994	£1,787	£2,119
14000-16000	14001	16000	£2,179	£1,937	£2,414
16000-18000	16001	18000	£2,060	£1,775	£2,289
18000-20000	18001	20000	£2,035	£1,875	£2,210
20000 + (assumed manual entry)	20001	26000	£2,000	£1,800	£2,200

Table 6-9: Schools construction cost benchmarks for DfE/EFA at Q2 2010

The above cost benchmarks in the 'Average' category were applied for the research at Q2 2010 price levels, and by multiplying with an uplift factor for those LEP-built schools located in London boroughs using BCIS location factors[30] as shown in Table 6-10. No benchmarks were available for any schools over 20,000m^2, so a manual entry was used in Table 6-9 and 6-10.

LAs	Index	Uplift factor
Average all 44 LAs with LEPs	100.0	
Average of all 12 London boroughs	111.4	1.12

GIFA m^2	Average £/m^2 uplifted with location factor for London boroughs
0–2000	£3,344
2000–4000	£3,261
4000–6000	£3,010
6000–8000	£2,701
8000–10000	£2,532
10000–12000	£2,323
12000–14000	£2,228
14000–16000	£2,435
16000–18000	£2,302
18000–20000	£2,274
20000+ (manual entry)	£2,234 (manually estimated)

Table 6-10: Average construction benchmarks uplifted to BCIS London location factors

[30] BCIS website for location factors, www.rics.org/uk/knowledge/bcis/ (accessed: February 2015)

6.5.3.3 Construction cost benchmarks for refurbishments and/or extensions

The Cabinet Office (2015) construction cost benchmarks were only available for new build schools. In order to appraise any refurbishment and/or extension projects delivered by LEPs, Table 6-11 shows the relevant cost benchmarks extracted from the BCIS website.[31]

Type of work	Building function	Cut-off years	Sample size	Mean £/m²
Extension	Primary schools	5	51	£1,489
Extension	Secondary schools (high schools)	5	5	£1,357
Rehabilitation/conversion	Primary schools	5	9	£711
Rehabilitation/conversion	Secondary schools (high schools)	5	2	£506

Table 6-11: BCIS construction cost benchmarks for DfE/EFA at Q2 2010

To allow for all possible scenarios, Table 6-12 presents the various options based on the BCIS benchmarks in Table 6-11. One observation from the BCIS benchmarks is that, apart from the primary school extensions, sample sizes that were used by BCIS to establish a benchmark are low especially for secondary school refurbishments (2) and extensions (5). Benchmarks for any schools that are both significantly refurbished and partly new build are calculated as an average between these benchmarks.

	Average £/m²	Average £/m² incl. London factor
Primary school part new build extension only	£1,489	£1,663
Secondary school part new build extension only	£1,357	£1,516
Primary school significantly refurbished only	£711	£794
Secondary school significantly refurbished only	£506	£565
Primary school significantly refurbished and part new build extension	£1,100	£1,229
Secondary school significantly refurbished and part new build extension	£932	£1,041

Table 6-12: Average BCIS cost benchmarks uplifted to London location factors

6.5.3.4 Operational cost benchmarks

In order to appraise the operational costs for hard FM, soft FM and utility consumption of LEP-built schools against industry benchmarks, operational cost averages at July 2010 price levels were downloaded from the BCIS website[32] as presented in Table 6-13.

Name	Decorations	Fabric	Services (M&E*)	Total hard FM
Primary schools (£/m²/year)	3.34	10.41	14.66	28.41
Secondary schools (£/m²/year)	2.86	10.41	13.72	26.99

Name	Cleaning	Admin costs	Total soft FM
Primary schools (£/m²/year)	16.56	18.04	34.6
Secondary schools (£/m²/year)	17.06	18.04	35.1

Name	Utilities
Primary schools (£/m²/year)	11.11
Secondary schools (£/m²/year)	10.32

* M&E = Mechnical and Electrical Services

Table 6-13: BCIS maintenance costs benchmarks

[31] BCIS website, www.rics.org/uk/knowledge/bcis/ (accessed: Feb-2015)
[32] BCIS portal, http://service.bcis.co.uk.libproxy.ucl.ac.uk/BCISOnline/LifeCycleCosts/Results (accessed: Oct-2014)

To allow for comparison of the Consistent Financial Reporting (CFR) data and Statistical First Release (SFR) data expenditure cost codes (E#) against the above BCIS categories, a level of consolidation has been applied, as can be seen in Table 6-14. For example, average hard FM costs is a combination of E04, E12 and E13. A detailed description of what is (and is not) included in the BCIS categories and the DfE CFR and SFR datasets is in **Appendix J3**.

BCIS REPORT (accessed Oct 2014)	BCIS norm		BCIS London location factor	
Hard FM average (E04, E12, E13)	27.7	£/m2/yr	30.95	£/m2/yr
Sample selection 20% lower threshold	22.2	£/m2/yr or less	24.8	£/m2/yr or less
Sample selection 20% upper threshold	33.2	£/m2/yr or more	37.1	£/m2/yr or more
Soft FM average (E06, E14, E25)	34.9	£/m2/yr	38.93	£/m2/yr
Sample selection 20% lower threshold	27.9	£/m2/yr or less	31.1	£/m2/yr or less
Sample selection 20% upper threshold	41.8	£/m2/yr or more	46.7	£/m2/yr or more
Utilities average (E16)	10.7	£/m2/yr	11.97	£/m2/yr
Sample selection 20% lower threshold	8.6	£/m2/yr or less	9.6	£/m2/yr or less
Sample selection 20% upper threshold	12.9	£/m2/yr or more	14.4	£/m2/yr or more

Table 6-14: BCIS maintenance costs benchmarks with thresholds and location factors

The standard KPIs for operational costs in the original BSF policy document allowed for costs to come within 20% either side of the benchmark. This will be discussed in section 8.2 with specific reference to Table 8-2. Below is a brief explanation of the E-codes from Table 6-14:

Category	CFR/SFR code	Expenditure
Hard FM	E04	Premises staff (£/m^2/yr)
Hard FM	E12	Building maintenance & improvement (£/m^2/yr)
Hard FM	E13	Grounds maintenance & improvement (£/m^2/yr)
Soft FM	E06	Catering staff (£/m^2/yr)
Soft FM	E14	Cleaning and caretaking (£/m^2/yr)
Soft FM	E25	Catering supplies (£/m^2/yr)
Utilities	E16	All costs related to fuel and energy (£/m^2/yr)

Table 6-15: Explanation of the BCIS E-codes

6.5.4 Sampling strategies for asset-level data

The aim of this section is to establish sampling strategies to enable the appraisal of asset-level data (LEP-built schools) against asset value criteria (legacy BSF policy objectives). This will be covered in detail in chapter 8. The methodology is that of a MCA, which is an umbrella term used to describe a series of formal analyses which assist decision makers in taking explicit account of multiple criteria in moving towards a solution (Belton and Stewart, 2002). MCA concerns the making of choices using multiple, and often conflicting, criteria, in efforts to arrive at pre-considered desired outcomes (Ward et al., 2016). The last 20 years have shown an accelerated interest in MCA and it is now widely used for both appraising policy and project options as a basis for decisions on their adoption or implementation (Köksalan et al., 2011). There are many types of MCA frameworks (Belton and Stewart, 2002; Greco et al., 2016; HM Treasury, 2011a; Vincke, 1992). MCA provides support when deciding on preferences, by choosing options that refer to an explicit set of objectives assigned to a decision-making body (as was the case with the legacy BSF LEPs). Such criteria, related indices and targets represent measures and assessments of the extent to which the objectives of the decision-making exercise have been or can be achieved (Ward et al., 2016).

Ward et al. (2016) recognise that policy leaders often apply forms of MCA for the appraisal of large-scale infrastructure projects. A generic MCA framework and attendant processes could help imbed policy leadership firmly within multi-stakeholder decision-making. A policy-led MCA was introduced by Ward et al. (2016) as a framework to allow the inclusion in the appraisal process of multi-stakeholder and multi-sector perspectives, in line with policy guidelines with the view to facilitating the trade-offs made by decision makers in achieving key objectives involving complex planning problems inherent to large-scale infrastructure.

The MCA framework applied for this research study is broadly in line with the UK government's ex-post appraisal and evaluation framework in The Green Book by HM Treasury (2011a) and as referred to in guidance by the Department for Communities and Local Government (2009, pp. 30-44). This type of MCA framework can be applied to:

- **Financial analysis**. An assessment of the impact of an option on the decision-making organisation's own financial costs and revenues.
- **Cost-effectiveness analysis**. An assessment of the costs of alternative options which all achieve the same objective. The analysis compares the costs of alternative ways of producing the same or similar outputs. The costs need not be restricted to purely financial ones.
- **Cost–benefit analysis**. An assessment of all the costs and benefits of alternative options. The analysis quantifies in monetary terms as many of the costs and benefits of a proposal as feasible, including items for which the market does not provide a satisfactory measure of economic value.

Source: HM Treasury (2011a)

Although no optimal application is shown, the guidance by HM Treasury is a frequently used framework which embeds common features in many other frameworks. Typically, the steps of a MCA are as described below:

1. Establish the decision context. What are the aims of the MCA, and who are the decision makers and other key players?
2. Identify the options.
3. Identify objectives and criteria that reflect the value associated with consequences of each option.
4. Describe expected performance of each option against the criteria. (If the analysis is to include steps 5 and 6, also 'score' the options, i.e. assess the value associated with consequences of each option.)
5. 'Weighting'. Assign weights for each of the criteria to reflect their relative importance to the decision.
6. Combine the weights and scores for each of the options to derive an overall value.
7. Examine the results.
8. Conduct a sensitivity analysis of the results to changes in scores or weights.

Sources: Department for Communities and Local Government (2009), HM Treasury (2011a)

This research study does not apply steps 5 and 6, but solely uses the contracted performance criteria that were set in the legacy BSF policy and in line with industry benchmarks such as BCIS, using July 2010 as a marker date (at this date, BSF had been cancelled).

For each whole-life asset value criterion to be identified in chapter 8 in response to research objective 1, variables from specific schools datasets from Table 6-5 and **Appendix J2** were called upon and merged into a master dataset using a unique identifier. Subsequently, four steps were taken to examine the results for each asset value criterion against the national industry benchmark set (Table 8-2):

- Step 1: Using formulaic filters in MS Excel, calculated how many variable entries met each criterion set, how many did not, and any missing values.
- Step 2: Using compounded formulaic filters, the frequencies were allocated for single variables and for a combination of two variables within that single criterion set (e.g. BREEAM status and/or building services type).
- Step 3: Applying frequency tables and formulaic filters from the previous step, new compounded formulas were created in MS Excel that met the combined criteria for environmental sustainability and VfM.
- Step 4: Using pivot tables, the results were filtered at each procurement stage. After correcting for any errors and missing values, it was possible to extract the frequency and net effect ratio outputs.

The data analyses and interrogation using MCA methodology will be covered in chapter 8.

6.5.5 Limitations

There are limitations pertaining to the asset-level data sources, sample set, input assumptions and sampling strategies:

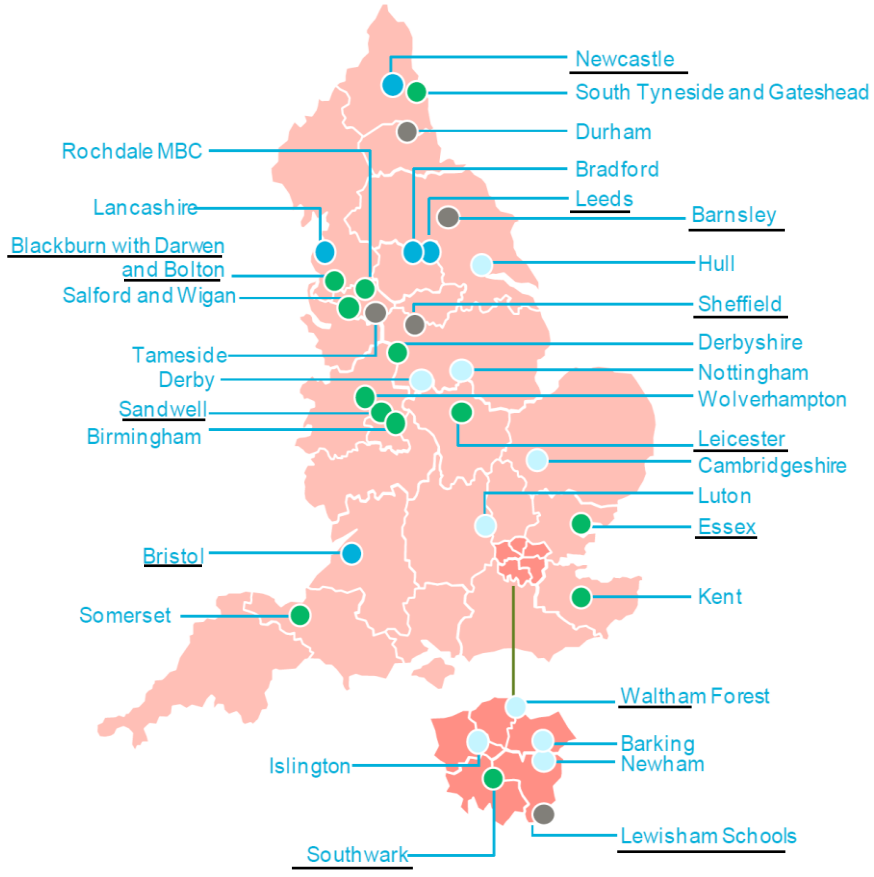
- The 44 operational LEPs have alongside a portfolio of schools also delivered other infrastructure contracts (**Appendix C**, section 2.5). These include: ICT infrastructure, social housing schemes, regeneration works, Council offices, leisure facilities, community centres, libraries and renewable energy initiatives. These other contracts procured through LEPs are excluded from the data analyses. Focusing on education provision only (nurseries, primary and secondary) allowed a more accurate comparison and appraisal of data that may already be subject to multiple, and sometimes conflicting, criteria.
- Operational LEPs may have put in place a different set of KPIs that do not measure the standard KPIs in the SPA Schedule 14. Consequently, those LEPs will have not attempted to collect and supply the same data selected for the MCAs in this research, resulting in more missing data.
- The use of multiple datasets to collect entries for a single variable can compromise the accuracy of any further statistical analyses. The data had to be cleaned and manipulated before it could be transferred from the source dataset into the master database. How variables are selected from multiple data sources to create a crude proxy for an asset value criterion will be discussed in section 8.3.
- Data was collected from LEP-built schools that were completed at various dates between 2006 and 2016. Data from schools completed in 2015 and 2016 was collected but a minimum of one full year of operational data was needed to enable the MCA to include all whole-life asset value criteria. This is discussed further in section 8.3.

6.6 Organisation-level data collection

This section aims to bring further detail to data sources obtained at LEP level comprising multiple project organisations. First, how the data is structured by LEP, entity type and contract mechanism is examined. Second, key characteristics of each of the entity types are discussed. Third, sampling strategies on how interview survey data was gathered from key participants in LEPs to explore what is learned, particularly from the complex and little-understood situations in practice, is reviewed. Finally, limitations about the data collection process are raised.

6.6.1 Breakdown of the organisation-level data

Of the 44 LEPs that had reached FC prior to the cancellation of BSF in 2010, 12 were identified for further investigation. Figure 6-1 shows the geographical spread of the 44 LEPs and the 12 LEPs identified for research (underlined) representing a fair sample of the LEP market. Section 6.6.3 will explain in detail how and why this selection occurred.



MBC = Metropolitan Borough Council

Source: BSFI (2011)

Figure 6-1: Overview of BSF LEPs in England

As explained in section 6.3.2, the primary unit of analysis is made up of the key contract participants involved in the temporary organisation: the LEP. The secondary unit of analysis are the assets delivered by the LEP: the schools discussed in section 6.5. The identification of the research entities broadly follows a textbook example of typical participants in a PPP or PFI structure (Weber and Alfen, 2010, p. 155). At the LEP level, the following research entities are selected for further investigation:

1. **Local Authority** (public sector client)
2. **Equity Investor** (private sector partner investing equity in the LEP)
3. **Design and Build contractor** (design and construction)
4. **Facilities Management provider** (soft and hard FM services)
5. **LEP/SPV General Manager (GM)** (LEP management and that of any PFI SPVs)
6. **Lenders' technical advisor** (for PFIs, and Independent Certifier for non-PFIs)

In section 6.6.2, these six research entities are described and explained. Their involvement is required when utilising the contract management mechanisms in the SPA (PfS, 2008c). In total, 12 contract mechanisms have been identified, as shown in Table 6-16, reflecting the key performance obligations in the SPA and supply chain contracts.

Stage	Contract performance mechanism	BSF contract reference
PLAN	1. LEP Company Business Plan	SHA, Schedule 3
	2. Partnering Services Specification	SPA, Schedule 12
	3. Collective partnership Targets	SPA, Schedule 14, part 1
DO	4. New Projects Approval Procedure	SPA, Schedule 3
	5. Cost Benchmarking Procedure for new projects	SPA, Schedule 21
	6. Market Testing Procedure for new projects	SPA, Schedule 4
CHECK	7. PFI Payment Mechanism & PMS	PA Payment Mechanism, Schedule 6
	8. Non-PFI FM/ICT Payment Mechanism & PMS	SA Payment Mechanism, Schedule 5
	9. PFI Benchmarking & Market Testing	PFI Project Agreement
ACT	10. LEP/SPV Board Report & Management Accounts	Management Services Agreement
	11. Key Performance Indicators	SPA, Schedule 14, part 2
	12. Continuous Improvement Targets	SPA, Schedule 15

Table 6-16: Key policy mechanisms in BSF standard form of contracts

A summary for each of these mechanisms is provided in **Appendix G1** with further context in **Appendix C2**. LEPs can deliver any contract mechanism separately, but focused performance improvement is envisaged through delivery as a holistic end-to-end approach covering all. In some cases, LAs and their private partners have faced difficulties in the understanding of, and working with, the complex processes and procedures in many of the contract mechanisms. There are more, but the 12 listed in Table 6-16 are considered the most important to evaluate critical lessons from LEPs adopting these. Eight of above were selected for further research and the reason for this reduction will be explained in section 9.3. Table 6-16 is split into four parts (Plan-Do-Check-Act) in line with the conceptual learning framework (AVEM) proposed in section 7.7 on page 193. The above discussion is summarised in Table 6-17.

ID #	LEP name	LEP participant (entity)	AVEM	Key contract mechanism
1	LEP 1	Local Authority	Plan	1. Company Business Plan
				2. Collective Partnership Targets
			Do	3. New Projects Approval Procedure
				4. Cost Benchmarking Procedure for new projects
			Check	5. PFI Payment Mechanism & PMS
				6. Non-PFI FM/ICT Payment Mechanism & PMS
			Act	7. Key Performance Indicators
				8. Continuous Improvement Targets
2	LEP 1	Equity Investor	(PDCA)	(1 to 8)
3	LEP 1	D&B contractor	(PDCA)	(1 to 8)
4	LEP 1	FM provider	(PDCA)	(1 to 8)
5	LEP 1	LEP/SPV General Manager	(PDCA)	(1 to 8)
6	LEP 1	Lenders' TA	(PDCA)	(1 to 8)
7–12	LEP 2	(all 6 participants)	…	…
…	…	…	…	…
66–72	LEP 12	(all 6 participants)	(PDCA)	(1 to 8)

Table 6-17: Sample size and breakdown of LEP data

6.6.2 Explanation of the entity types

This section describes and explains the key characteristics for each entity type. Abstained parties for further investigation are the Strategic Partnering Board and the schools because these are stakeholders instead of contract parties. Another limitation is that doing more than 72 face-to-face interviews would be too risky due to time constraints.

1. Local Authority (LA). The council with statutory responsibility for delivery of education in a local area acting as the public sector client, the project sponsor in BSF projects. The LA is also a 10% equity shareholder of the LEP, the public counterparty of the SPA, formulator of LA requirements, approves/rejects new project proposals submitted, and provides strategic perspective. LAs work with the LEP and its supply chain to deliver projects, monitor and oversee delivery of partnering services, and contract targets and commitments (PfS, 2009c).

2. Equity Investor (EI) or PSP. The private organisation with which a LA enters into contract. The EI takes a majority stake of 80% within the LEP, and is often also an investor in any PFI contracts with the LA. An investor may itself comprise several consortium members but it may also be a single company. Representative business function for this discipline is the investment director or asset director. These can be infrastructure funds, commercial or public banks, investment divisions of major contractors, or institutional investors. Director responsibilities are through the LEP Board and by providing strategic commercial perspectives for the LEP (4ps and PfS, 2008).

3. LEP/SPV General Manager (GM). The LEP GM (also called LEP chief executive) works directly for the LEP on behalf of its public and private shareholders and also fulfils the SPV management role for its PFI projects (PfS, 2009b). Responsibilities are to coordinate and lead the operational activities of the LEP, manage relationships within the LA, operational responsibility for the quality and timeliness of LEP delivery on capital and service elements, management of supply chain relationships, ensure integration and coordination of the LEP's sub-contracts, oversee the governance process from the LEP's perspective, and implement the strategy and financial management of the LEP (PfS, 2009c).

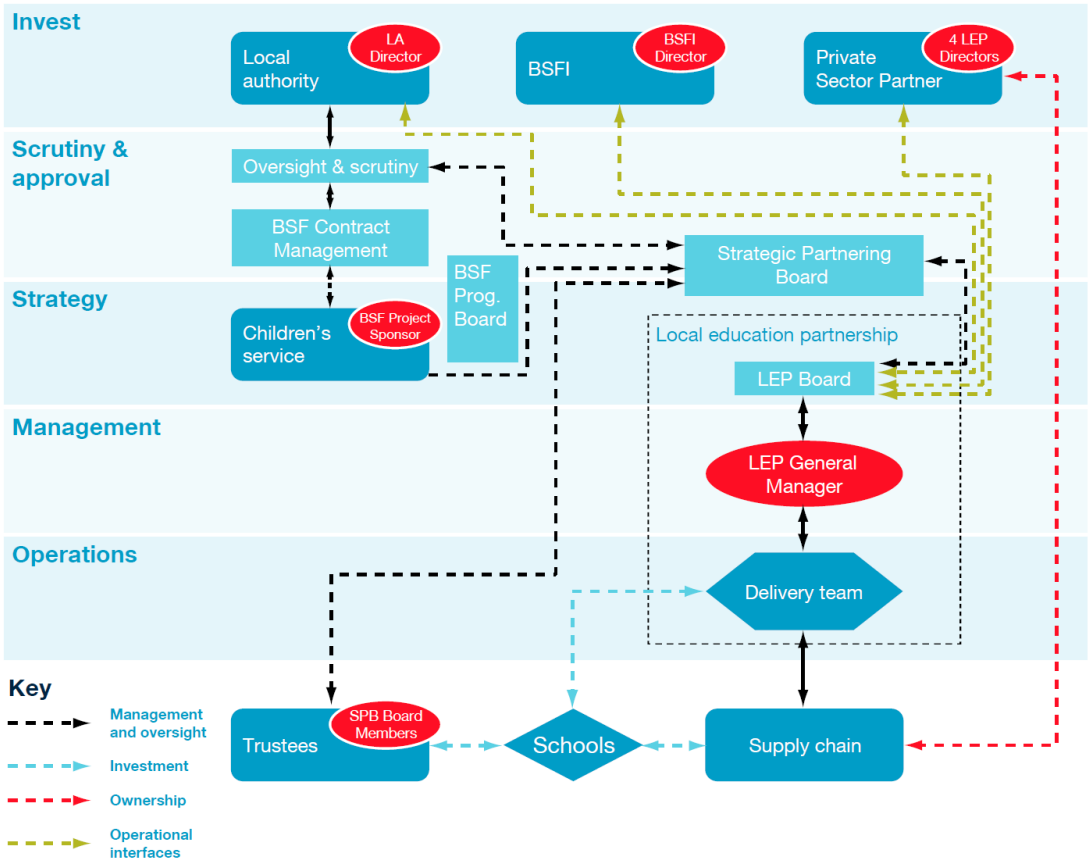
4. Design and Build (D&B) contractor. The party providing the D&B services to a PFI project company or to the LEP in connection with a building contract. Project(s) procured by the LA on a D&B basis are implemented by the D&B contractor appointed to the LEP. In BSF, obligations of the LEP are substantially subcontracted to a construction company, which forms part of the LEP's supply chain, subject to caps and exclusions on certain liabilities (BSFI, 2011).

5. Facilities Management (FM) service provider. The company that provides a combination of building maintenance and operational services. The project(s) procured by the LA for the delivery of FM services is(are) implemented by the FM provider appointed to the LEP. In the

case of non-PFI FM agreements, the obligations of the LEP are substantially subcontracted to an FM service provider which forms part of the LEP's supply chain, subject to caps and exclusions on certain liabilities (BSFI, 2011). In the case of PFI FM agreements, the obligations of the PFI SPV are substantially subcontracted to an FM service provider.

6. Technical Advisor (TA). The appointed advisors on behalf of the senior lenders responsible for the technical due diligence and operational monitoring for PFIs, and in the case of non-PFIs the IC acting on behalf of the LEP and the LA. Senior lenders are providers of debt to a PFI SPV for the purposes of financing a PFI project.

The standard governance structure in Figure 6-2 is only illustrative as LAs, LEPs and stakeholders have considered and developed it separately to ensure it worked effectively for them (PfS, 2009c). The figure shows more participants than the six mentioned above; however, the data sources utilised are spread across the typical activities of a LEP: invest, scrutiny and approval, strategy, management and operations.



Source: PfS (2009c, p. 7)

Figure 6-2: Standard LEP governance diagram with key stakeholders

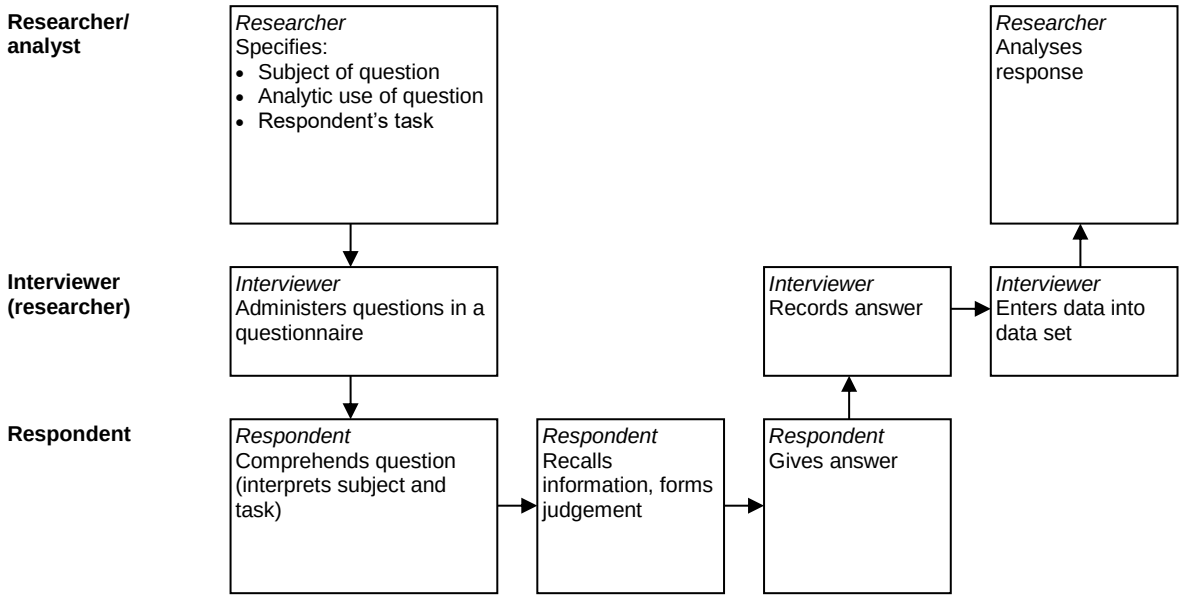
There are a number of observations about the original LEP governance structure in Figure 6-2 (PfS, 2009c):

- Groups, formal bodies, teams within organisations and individuals are all included – LEPs were expected to become efficient at delegating through the governance structure, with a focus on strategic decision-making and review at the top and delivery at the bottom.

- The Strategic Partnering Board is both part of the monitoring and approval process and the strategic process, in that in many cases it approves new projects and monitors the LEP's performance as well as inputting to the SfC updates.
- The LEP board directors, the LEP GM and the LA BSF project sponsor are key roles within the governance structure. Without these individuals having the right skill sets and experience, effective delivery is very difficult to achieve.
- This model assumes a highly integrated delivery team with some LA resource sitting within the LEP and assumes that LA personnel are managed by the LEP through secondment. If management and operational delivery is retained by LAs, additional governance is required to ensure that operational teams across organisations are working together effectively.

6.6.3 Sampling strategies for data gathering at organisation level

The research strategy (section 5.3) covers a comprehensive semi-structured interview survey. Surveys are useful to investigate the similarities and differences in opinions and working practice of standard legacy BSF contract performance mechanisms (section 6.6.1). Questionnaires were prepared for 72 semi-structured interviews with six key participants involved in 12 operational LEPs. Further detail is in section 6.7. The semi-structured interviews involved the use of ten similar pre-planned questions about each of the ten contract mechanisms but were not necessarily asked in the same order as they were listed; rather, they were asked dependent on whether a respondent was directly involved during day-to-day operations. If not, then the relevant section was skipped. Thus, the questionnaire in **Appendix K3** only served as a guide to ensure that all relevant questions were asked. Interesting issues that emerged were further probed as the interviews progressed with 'how' and 'why' questions, reflecting aspects of what Sinkovics and Alfoldi (2012) refer to as progressive focusing. The interview design model was based on the survey data collection process in Figure 6-3.



Source: adapted from Czaja and Blair (1996) and Robson (2002, p. 242)
Figure 6-3: Survey data collection process

A detailed interview survey protocol, enclosed in **Appendix K2**, explains how the limited list of survey questions was produced.

A meeting was held between UCL and the EFA on 20 November 2012 to discuss the protocol and agree which 12 LEPs would be prioritised and approached to participate in the research study. Several factors were considered: (1) completion of the full pipeline of schools; (2) mixture of PFI and non-PFI contracts (at least two PFIs delivered through the LEP); (3) access to contact details and people's diaries; and (4) equal geography between the North, Midlands and South of England. The notes of the meeting are in **Appendix K1**. Following the meeting, a letter of support was produced by the EFA that could be enclosed with the formal mailings to each of the 72 LEP survey respondents (**Appendix B1**). The 44 LEPs that had reached FC prior to the cancellation of BSF are as follows, with the 12 LEPs identified for further investigation marked in green in Table 6-18.

Operational LEPs that had reached Financial Close under BSF							
No	**LAs with LEPs**	**Prioritised by EFA**	**Region**	**FC date**	**# of schools**	**Main LEP investor**	**Comment**
01	Barking & Dagenham	No	South	Oct-09	6	Laing O'Rourke	Sample schemes only, only one PFI
02	Barnsley	Yes	North	Jul-09	11	Laing O'Rourke	Identified for survey interviews
03	Birmingham	Yes	Midlands	Sep-09	19	Lend Lease	Rejected
04	Blackburn with Darwen	Yes	North	Jan-10	15	Balfour Beatty	Identified for survey interviews
05	Blackpool	No	North	Nov-10	3	Eric Wright Group	Sample schemes only, small portfolio
06	Bradford	Yes	North	Dec-06	22	Costain / InfraRed	Rejected
07	Bristol	Yes	Midlands	Jun-06	42	Skanska	Identified for survey interviews
08	Cambridgeshire	No	Midlands	May-10	5	Galliford Try	Small portfolio
09	Camden	No	South	Dec-10	3	BAM PPP	Sample schemes only, small portfolio
10	Derby	No	Midlands	Dec-10	3	Balfour Beatty	Sample schemes only, small portfolio
11	Derbyshire	No	Midlands	Jul-09	6	Equitix	Only one PFI
12	Durham	Yes	North	Aug-09	13	Carillion / Amber	Work conflict (outside PhD research)
13	Ealing	No	South	Dec-10	3	Balfour Beatty	Sample schemes only, small portfolio
14	Essex	Yes	South	May-10	8	Skanska	Identified for survey interviews
15	Hackney	No	South	Nov-08	11	Balfour Beatty	No PFIs
16	Halton	No	North	May-11	3	Galliford Try	Small portfolio, only one PFI
17	Hertfordshire	No	Midlands	Jan-11	4	Balfour Beatty	Sample schemes only, small portfolio
18	Islington	Yes	South	Jul-08	11	Balfour Beatty	Optional backup
19	Kingston upon Hull	Yes	North	Mar-10	23	Morgan Sindall	Optional backup
20	Kent	No	South	Oct-08	24	Kier	Only one PFI
21	Lancashire	Yes	North	Dec-06	17	Lend Lease	Rejected because LEP is mothballed
22	Leeds	Yes	North	Apr-07	21	Interserve	Identified for survey interviews
23	Leicester	Yes	Midlands	Dec-07	22	Miller	Identified for survey interviews
24	Lewisham	Yes	South	Dec-07	13	Costain	Identified for survey interviews
25	Luton	No	Midlands	Jun-09	10	Wates	Work conflict, only one PFI
26	Newcastle	Yes	North	Jul-07	27	Robert McAlpine	Identified for survey interviews
27	Newham	Yes	South	Jan-09	14	Laing O'Rourke	Identified for survey interviews
28	North Lincolnshire	No	North	Jul-09	7	Kier	No PFIs
29	Nottingham	No	Midlands	Jun-08	19	Carillion / Amber	Work conflict (outside PhD research)
30	Oldham	No	North	Dec-10	7	Balfour Beatty	Sample schemes only, small portfolio
31	Rochdale	Yes	North	Jan-10	15	Carillion / Amber	Work conflict (outside PhD research)
32	Salford & Wigan	Yes	North	Dec-09	15	Laing O'Rourke	Rejected
33	Sandwell	Yes	Midlands	Jul-09	16	Interserve	Identified for survey interviews
34	Sheffield	Yes	Midlands	Jul-07	20	Vinci / InfraRed	Identified for survey interviews
35	Somerset	No	Midlands	Sep-10	4	BAM PPP	Sample schemes only, small portfolio
36	S. Tyneside & Gateshead	Yes	North	Dec-07	23	Carillion / Amber	Work conflict (outside PhD research)
37	Southwark	Yes	South	May-09	13	Balfour Beatty	Identified for survey interviews
38	St Helens	No	North	Oct-10	5	Interserve	Sample schemes only, small portfolio
39	Stoke-on-Trent	No	Midlands	Feb-10	19	Balfour Beatty	No PFIs
40	Tameside	Yes	North	Feb-09	12	Carillion / Amber	Work conflict (outside PhD research)
41	Tower Hamlets	No	South	Jan-09	23	Bouygues	No PFIs
42	Waltham Forest	No	South	Aug-07	7	Bouygues	Small portfolio, only one PFI
43	Westminster	No	South	Apr-08	10	Bouygues	No PFIs
44	Wolverhampton	Yes	Midlands	May-10	26	Carillion / Amber	Work conflict (outside PhD research)
					600		

Table 6-18: Details of BSF LEPs and those identified for survey interviews

The LEPs in Islington and Kingston upon Hull were identified as optional backup for interviews, in case one of the 12 identified LEPs would not yield sufficient participation or survey response.

Table 6-19 shows the summary data for each of the 12 LEPs that were investigated for this research study. Each LEP broadly adopts the standard LEP structure and uses the standard form of BSF contracts, but tailored the specific educational visions within its LA. They all have a mixture of PFI and non-PFI procured projects. Non-PFI projects are mainly traditionally procured projects: D&B, sole FM and/or ICT contracts.

LEP number	**02**	**04**	**07**	**14**	**22**	**23**	**24**	**26**	**27**	**33**	**34**	**37**
City	**Barnsley**	**Blackburn with Darwen**	**Bristol**	**Essex**	**Leeds**	**Leicester**	**Lewisham**	**Newcastle**	**Newham**	**Sandwell**	**Sheffield**	**Southwark**
Region	North	North	South	Mid	North	Mid	South	North	South	Mid	Mid	South
LEP established	2009	2010	2006	2010	2007	2007	2007	2007	2009	2009	2007	2009
Portfolio size (schools)	11	15	42	8	21	22	13	27	14	16	20	13
# PFI new build	8	3	4	4	5	5	6	11	2	3	4	3
# Non-PFI new build	3	5	9	1	9	7	1	7	1	5	5	5
# Non-PFI refurbished and/or partly extended	0	7	29	3	7	10	6	9*	11	8	11	5
# Secondary provision	10	10	12	6	15	15	11	14	8	8	17	9
# Primary/PRU/SEN	1	5	30	2	6	7	2	13	6	8	3	4
Total capex at £ million (RPI July 2010)	>333	>192	>364	>125	>357	>260	>188	>390	>164	>212	>335	>172
Pupil capacity (approx.)	13150	11750	23550	5900	20800	18200	11700	23000	14650	14700	19400	8050

* 3 schools at Newcastle LEP are PFI refurbishment projects

Table 6-19: Project information for the investigated LEPs

Precondition: the names of individual respondents and LEPs have been anonymised as per the NDAs signed. Conclusions are drafted upon shared opinions across multiple LEPs, so for the research there is no need to reveal names of individuals or companies. Each respondent was a key influential person within its discipline: a project director or account leader. Full data analysis and interrogation using the interview surveys will be covered in chapter 9.

6.6.4 Limitations

The data collection process had the following limitations:

- Due to the NDAs signed with a number of LEPs, no more details of the contractual and financial development and delivery structures, their school portfolios and timescales could be provided. All the LEPs surveyed applied the standard LEP procurement model.
- The decision about which of the 44 LEPs to select for survey interviews was influenced by the fact that the researcher was working in the industry with the same firms. Table 6-18 shows where this applied, with the comment ‘work conflict’.
- While clear instructions were sent in advance, it was not always apparent to respondents that their responses to the semi-structured questionnaire should be reflective observations and opinions of their experiences of the LEP’s long-term operations since FC, instead of a snapshot opinion of the LEP’s current state of affairs.

6.7 Conducting the benchmarking interviews

6.7.1 Semi-structured interview questionnaires

Semi-structured interviews are the primary source of data in interpretative qualitative research as this allows for participants' views and interpretation of actions and events to be gathered (Darke et al., 1998). This type of interview is the primary data collection method to deal thoroughly with the difficulties in exploring inter-organisational dynamics in the context of the LEP's shareholders and its supply chain.

The semi-structured questionnaire (**Appendix K3**) was developed to facilitate the interviewing process and consisted of a 50/50% mixture of open and closed questions. Questions were formulated based on a comprehensive questionnaire about research by Akintoye et al. (2000) on risk assessment and management of PFI/PPP projects. Major interview survey questions with which to capture observations and opinions about key contract requirements were formulated and added to the survey questionnaire. Questions were grouped so that they can be structured around the three pillars of the conceptual learning framework (see Figure 7-12): Commitment, Communication, Culture. Each survey question was formulated with an ordinal answering category, followed by a 'why' question. An interview protocol (**Appendix K2**) and an outline of the research study were issued along with the questionnaire to each of the respondents at the start of the interview. The questionnaire was piloted by the Sheffield LEP project director, which subsequently delivered the first set of data entries. Based on the pilot interview, questions were only slightly revised and adapted for subsequent application. Results of the pilot interview were incorporated in the overall body of the research.

All interviews were face-to-face and most of them were held in the office location. There were two telephone interviews, conducted after office hours due to the full agenda of the respondent. Interviews to generate benchmarking data were conducted between January 2013 and May 2014. Ultimately, 69 of the 72 approached respondents were interviewed, except for: (70) D&B contractor at Newham LEP, (71) the LA at Newcastle LEP, and (72) the Lenders' TA at Newcastle LEP. The participating respondents were prepared to assist and the general atmosphere was positive.

The average duration of the meetings was between 1.5 and 2.5 hours. In a few instances, the interviewees volunteered for only 1 hour, and on other occasions the duration exceeded 4 hours. Fortunately, all questions were covered, but on three occasions the questionnaire had to be completed by a follow-up telephone conversation. To produce a detailed and accurate narrative of the responses to the questionnaire, each of the interviews was recorded digitally. This also enabled the researcher to focus more on the conversation instead of writing down precisely all the answers. The transcription exercise happened manually afterwards along with the data processing. All interviews were confirmed by the interviewees to be the correct writing and interpretation of answers given.

6.7.2 Origin of data sources

The following subsection provides a brief on the organisations within each of the 12 LEPs that provided data, their specific involvement in BSF and whether the respondents were involved in other PPP/PFI projects. The analyses rely on information gathered from interview survey data in MS Excel and project information available on each of the Council websites. The overview in Table 6-20 shows that, although the respondents were key figures within their organisations, at the peak of their BSF project, they were working with a team of professionals.

Number of staff involved in LEP	Respondent	Percentage
1	0	0%
2–5	13	18%
6–25	29	40%
26–50	4	6%
51–100	6	10%
101–500	11	15%
>500	5	7%
Not answered	3	4%
Total	72	100%

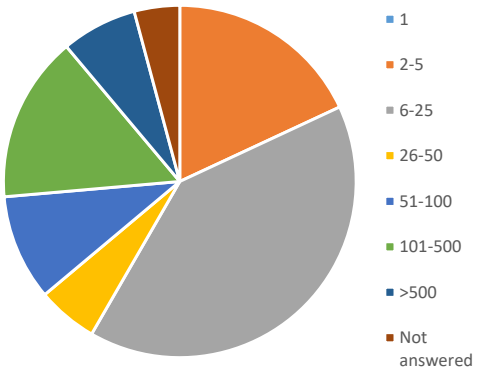


Table 6-20: Distribution of BSF staff per respondent

Respondents were asked to keep a focus on their own discipline. While complying with this request, some interviewees clarified that emphasis needed to be shifted to others as they were not involved in a certain contract mechanism. In these cases, answers were registered as 'Not answered' or 'Don't know'. Respondents were also asked to take a reflective view, not at a fixed point in time. This was to encourage a collection of balanced opinions over time, instead of observations that were predominantly influenced by current or recent events.

The mixture of PFI and non-PFI procurement routes is a feature that applies to the LEP model. It requires a level of skill and experience from the parties involved. Some questions were asked in the questionnaire to test the resource strength of the interviewees. Table 6-21 shows an equal spread of interviewees with experience in some mixture of PFI and non-PFI procurement for other PPP/PFI projects, and for BSF bids outside their current projects. On average participants were historically involved in 15 schools procured through a LEP, with a high deviation and a count of 69 responses (3 not answered).

Involvement in LEP-built school projects with a mixture of PFI and non-PFI.			
Discipline	**Average #**	**Minimum #**	**Maximum #**
Local Authority	16	9	42
Equity Investor	20	8	50
D&B Contractor	14	2	25
FM Services Provider	7	2	16
LEP/SPV General Manager	19	6	50
Technical Advisor	10	3	21
Across all disciplines	*15*	*2*	*50*

Table 6-21: Involvement in number of LEP-built school projects

A more in-depth discussion on the effects of different procurement routes involved in LEP-built schools will become apparent in section 8.5. The origin of the interviewees' experience and skills can be further clustered into their years of involvement post Financial Close of the LEP, as shown in Table 6-22. This is calculated based on the date of the interviews in 2013.

Years of involvement in the LEP post FC up until 2013					
Discipline	**Mean**	**Variance**	**Minimum**	**Maximum**	**Range**
Local Authority	5.4	5.0	1	7	9
Equity Investor	4.5	3.7	2	8	8
D&B Contractor	4.4	4.5	1	7	9
FM Services Provider	1.8	0.8	1	3	8
LEP/SPV General Manager	3.0	5.3	1	6	7
Technical Advisor	5.5	2.3	4	8	8
Not answered					23

Table 6-22: Respondents' involvement in LEPs

6.7.3 LEP-level data analysis

Data overload has been described as a prominent problem in qualitative research, especially given the cumbersome nature of words as compared to numbers (Miles and Huberman, 1994). The qualitative data analysis begins with data reduction, where textual data is abstracted through sorting, focusing, discarding and organising large segments of data by denoting them with codes, according to Miles and Huberman (1994). Coding is a process of assigning labels to segments of text based on their descriptive or inferential meanings (Bryman and Burgess, 1994; Miles and Huberman, 1994).

A large volume of information was generated through survey interviews with LEP participants, information requests with individual LEPs, and internet data mining. Any qualitative data generated by 69 participants in LEPs was coded and analysed using NVivo version 10. Any ordinal or nominal qualitative data was analysed using MS Excel spreadsheet software and MS Access (with VBA macro plugin). Any quantitative numerical data collected was analysed using the SPSS and Excel software.

To get an overview, large tables were produced comprising all the interview data recorded on questionnaires listed in named fields and columns. These contained answers to all 120 survey questions by all 69 respondents (three were unavailable to conduct an interview) participating in 12 LEPs. The metadata input tables are enclosed in **Appendix J1**. On four occasions, the respondent interviewed fulfilled the same role for the same company on a different LEP, and asked for the responses to be representative for both LEPs. Conversely, on seven other occasions, multiple people were in the room representing a single LEP respondent. On all other 58 occasions, the entries recorded represent the opinions and observations of sole individuals representing one LEP participant each.

6.8 Qualitative data analysis tools

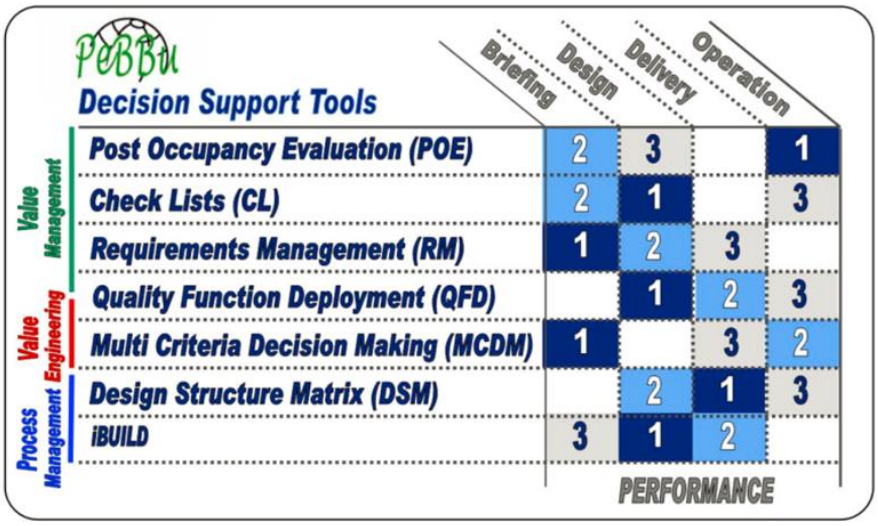
6.8.1 Introduction

At an early stage of the research, three toolkits were considered for analysing qualitative data gathered from the semi-structured interview surveys in support of research objective 2:

1) **Performance-Based Building Network (PeBBu) tools** (Huovila, 2005)
2) **Balanced Score Card – BSC** (Kaplan and Norton, 2001)
3) **Quality Functional Deployment – QFD** (ReVelle et al., 1998)

1. PeBBu tools

EU-funded research called Performance-Based Building Network (PeBBu)[33] finished in 2005 but the legacy provided some useful insights (Huovila, 2005). Domain 4 of the PeBBu project led by Gray (2005) about a project's or building's performance produced a paper called Decision Support Tools for Performance Based Building (Porkka et al., 2004). The following tools in Figure 6-4 were tested and applied by the PeBBu team in a built environment context and were accepted by other academics in the research domain of decision support tools.



Source: Porkka et al. (2004, p. 5)

Figure 6-4: Selected PeBBu decision support tools and their primary applicability

The numbers represent the ranking of how well a tool would perform at each procurement stage. A blank cell means there is no ranking, which implies the tool is not suitable at that stage. One tool that was not identified by the PeBBu team is Kaplan's BSC. This tool and QFD were considered in more detail for this research and after careful consideration QFD was chosen. One benefit of using QFD in the built environment is that performance analysis can take place during design, delivery and operation stages, which is where the LEP model has its core business activities. The clear structure and defined steps of QFD, plus the fact that it can be used at multiple stages of the asset life, made the approach better fit for purpose compared to each of the other PeBBu decision support tools or Kaplan's BSC technique. Although the Design Structure Matrix (Figure 6-4) appears to offer similar benefits, these are not as strong compared to QFD.

[33] PeBBu website: http://www.reading.ac.uk/PeBBu/

2. Balanced Score Card

The BSC was developed during the early 1990s as part of a research programme conducted on 12 firms (Kaplan and Norton, 1996). The BSC is a conceptual framework for translating an organisation's vision into a set of performance measures distributed across four perspectives: financial, customer, internal business processes, and learning and growth (Dror, 2008). According to Hudson et al. (2001), the BSC offers good coverage of performance measure dimensions, but provides no mechanism for building and maintaining the relevance of these defined measures.

It provides an organisation with: (1) a multidimensional assessment from four perspectives, and (2) a strategy map that defines the causality structure among these four perspectives. Hence, the BSC appears to have better potential to be used as a strategic framework for individual organisations. The causality structure described by means of the BSC map shows connections between the topics an organisation is planning to learn (learning and growth perspective) and its long-term planned financial results (financial perspective). Since the 2000s, the BSC has been a highly discussed, well-known and often abused framework in literature. Yadav and Sagar (2013), who cite Kanji and Moura e Sá (2002), argue that the BSC approach should be consistent with business excellence and TQM, and companies need to consider:

- maximising shareholder value;
- achieving process excellence;
- improving organisational learning; and
- delighting the stakeholders.

In response to some critics, Kaplan and Norton (2004) introduced an improved version of the original BSC in the form of strategy maps. A strategy map is a diagram describing how an enterprise creates value by connecting strategic objectives with each other in explicit cause-and-effect relationships across the four BSC perspectives.

3. Quality Function Deployment

When making decisions in any industry, one of the most privileged decision makers is the client. Satisfying their needs and expectations is of utmost importance for organisations involved. QFD is regarded as a highly effective and structured tool to systematically deal with client demands and to precisely define their requirements (Dikmen et al., 2005). Using QFD helps produce more accurate decisions by focusing on multiple aspects and criteria based on a client's needs (Mallon and Mulligan, 1993). The QFD approach has been applied to develop a decision support tool in many academic areas. However, it is not a simple tool. It can be seen as an entire quality management system (Govers, 2001), a briefing tool (Al-Bizri and Gray, 2014; Gray and Al-Bizri, 2006), a planning process (Anumba and Evbuomwan, 1997; Jafari, 2013), delivery tool (Arditi and Lee, 2003; Arditi and Lee, 2004) and an evaluation/enhancement tool (Azam Haron et al., 2015; Garibay et al., 2010). The background and history of QFD will be explored further in section 6.8.2.

Summary

QFD was chosen as an analysis toolkit for the qualitative data collected, based on the various arguments, as well as benefits and drawbacks of QFD as described and explained above. QFD can be used as a tool during briefing, design and delivery stage, but also for evaluations.

The next sections debate how QFD has been introduced and used in the construction industry since the early 2000s. Section 6.8.6 aims to review the methodological approach to QFD in the context of evaluating operational LEPs. Other implementation approaches that have been considered but not pursued further are: the Ishikawa cause-and-effect diagram, Porras' stream analysis method, Structured Analysis Design Technique, affinity diagrams, and Kano's model.

6.8.2 The case for QFD

The theory behind QFD dates originally from the late 1960s, when it was defined by Yoji Akao, and initially applied by Mitsubishi Heavy Industries in 1971 (Chan and Wu, 2002). Essentially, the QFD method means deploying the attributes of a product or service desired by the customer throughout all the appropriate functional components of an organisation (ReVelle et al., 1998). There are multiple definitions of QFD:

- To deploy, in detail, the jobs or business functions concerned with building up quality in end-means systems by steps. It is necessary to convert user quality requirements into counterpart technical characteristics so as to determine design quality for the finished product. Then, based on the counterpart characteristics, we systematically deploy the correlations among the quality of each functional component as well as the individual parts and each of the process elements (Akao, 1990).
- A method for structured product planning and development that enables a development team to clearly specify a customer's wants and needs, and then systematically evaluate each proposed product or service capability in terms of its impact on meeting those needs (Cohen, 1995).
- A structured and disciplined process that provides a means to identify and carry the voice of the customer through each stage of product or service development and implementation. This process can be deployed horizontally by marketing, product planning, engineering, manufacturing, service and all other departments in an organisation involved in product or service development (ReVelle et al., 1998).
- An adaptation of some of the TQM tools. In Japan in the late 1960s, QFD was invented to support the product-design process (for designing large ships). As QFD itself evolved, it became clear to QFD practitioners that it could be used to support service development as well. Today, its application goes well beyond product and service design to apply to any planning process where a team has decided to systematically prioritise possible responses to a given set of objectives. The objectives are called 'Whats', and the responses are called 'Hows'. QFD provides a method for evaluating How a team can best accomplish What (Ficalora and Cohen, 2009).

The QFD approach is not new and the associated matrix structure (reviewed in section 6.8.4) has been used for years in all kinds of industries all over the world. QFD is not difficult to use and can be applied in very different ways in product or service design, research or creativity. QFD is, in a way, both an advanced cause-and-effect analysis and a form of quality assurance (ReVelle et al., 1998). Gray and Al-Bizri (2004), who cite Rawabdeh et al. (2001), note that QFD is a structured approach that can help a project team represent performance objectives and priorities and then evaluate how and whether these objectives can be met. Experimentation has shown that using QFD helps thinking about the facility lifecycle early in the process, documenting the performance objectives and making transparent decisions, thus adding value to the customers (Huovila, 1999). Furthermore, QFD enables an understanding of links between choices and the potential conflicts between them (Al-Bizri and Gray, 2014).

QFD aims to help a client to define their needs, creating the performance brief based on those needs, designing, constructing, maintaining and operating the product and finally, demolishing it. Thus, a QFD method can make teams more aware of how a client's expectations are met, that management techniques are employed for maintaining a client's requirements and that solutions aim to continuously optimise the end product (Huovila et al., 1997; Kamara et al., 1999; Rawabdeh et al., 2001). Govers (2001) concludes on QFD that in competitive markets, companies are required to work on continuous quality improvements and innovation. Most of those improvements happen on a project-by-project basis. Evaluation tools and open-minded ICT systems are needed to stimulate organisational learning. That may demand a culture change because to a large extent implementation problems call upon a ceaseless adaptation of the organisation. The QFD research by Govers (2001) was applied in the production industry. He describes that the quality to be achieved in the development stage is not just the quality of the product but also that of the after-sales, services and even recycling and re-use. He suggests that QFD has to become an embedded way of quality management.

The QFD method employs a mathematical analysis using a series of matrices, which depend on functional relationships, to arrive at the highest level of quality in producing a product or service (Mallon and Mulligan, 1993). This involves statistical analysis of the frequency data of past events. While probabilistic analysis deals with predicting the likelihood of future events, the QFD method is primarily an applied branch of mathematics which tries to make sense of past observations in the real world. In readiness for QFD, some basic statistical analysis may be helpful, for example to be able to classify ordinal data in a way so it fits the QFD model, or to introduce weighted ranking to frequency data. How the QFD method works in detail is explained in sections 6.8.4 and 6.8.5.

6.8.3 QFD in the construction industry

The construction industry has been slow in adopting the QFD method as shown by the low number of applications reported in the literature (Delgado-Hernandez et al., 2007). Although QFD has limitations, Delgado-Hernandez et al. (2007) demonstrate that the method can be

used at multiple stages of the construction process and also the benefits from using QFD far outweigh the limitations. One benefit is that it carries forward, through the key stages of development, the initial project values and criteria in a way that ensures everyone is consistently working to the same values. By applying QFD, there is little dispute, reinvention or interpretation of the initial client values at any stage during a construction project, thus increasing the efficiency of the process (Gray and Hughes, 2001). Not everything can be covered in a single QFD matrix when analysing organisations involved in complex PPP procurement systems such as LEPs.

In practice, QFD can operate at multiple stages in construction, as displayed in Figure 6-4. At the highest level, it could help set the detailed design brief. The next stage is during development and construction until handover, and the final stage is when the building is in operation. Due to the consistent methodology, which links at all stages back to the satisfaction of the client's real priorities, the QFD tool is very powerful for recording the client's requirements during the various stages in the process and the value judgements made within that process. Gray and Hughes (2001) argue that these judgements have to be made through consensus of all participants involved in the project.

The tool enables quantification of the basic decisions so that the client and its contract partners are all aware of the implications of costs, production, and quality of every aspect of the building during the whole asset life. Embedding QFD in construction encompasses the same activities that people would do before (without QFD) but it replaces any erratic, intuitive decision-making processes with a structured method establishing relevant (often hidden) information, learning and experiences that are available throughout the organisation. It is this approach that serves as an operational definition of company-wide quality control (Sullivan, 1988) and supports organisational learning (Govers, 2001).

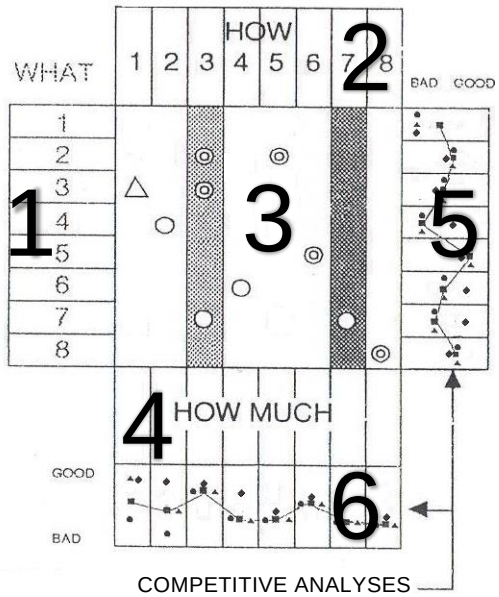
The quality characteristics to be worked out in the development phase are not just the quality of the product but also that of the post-completion services and even life-cycling and handover. When using QFD, the product planning phase serves especially to identify the customer requirements. It is not sufficient to respond to the customer's requests (expressed quality) but it is in fact necessary to study the whole area of so-called implicit quality (quality which is not asked for but is assumed to be there) and of attractive quality (quality which is not asked for because the customer does not even imagine that it can exist). This was explained by the Kano model (Govers, 1996; King, 1989). Gray and Al-Bizri (2006) point out that QFD can be a cumbersome technique where there are a large number of variables to encompass. They conclude that: *"QFD is a very powerful tool but needs to be modified and developed to meet the specific needs of construction briefing. This application has provided the necessary developments by taking a user perspective and providing information to meet the weaknesses in the existing methods"* (Gray and Al-Bizri, 2006, p. 2779).

6.8.4 QFD as an analysis tool for organisation evaluation

Before implementing a data analysis tool, its philosophy needs to be understood. QFD has been applied in multiple ways and so discrepancies in viewpoints lead to different approaches to the methodology. Govers (2001) approaches QFD not just as a research tool but also as a way of quality management and continuous improvement, emphasising the impact of organisational learning on innovation. Using QFD as an evaluation tool encompasses a structured methodology establishing relevant (sometimes hidden) information and experiences that are available throughout the organisation. For this reason, QFD can be considered an approach that supports and stimulates learning in organisations (Govers, 2001). With LEPs being joint ventures comprising multiple project organisations, QFD provides a rare opportunity to work on cross-functional teams, i.e. different participants involved.

Competitive markets such as infrastructure require continuous quality improvements and innovation. Traditionally, this happens on a project-by-project basis; however, in strategic procurement systems, it is based on portfolios of projects. Therefore, Govers (2001) urges that there is a need for sound evaluation tools and open-minded communication systems within organisations to stimulate organisational learning.

At first sight the QFD matrix, as shown in Figure 6-5, looks rather complex in that it has six parts. However, it only requires an understanding of the basic principles of matrix analysis with the addition of importance and benchmarking criteria (ReVelle et al., 1998, pp. 120-121). The aim of matrix analysis is to systematically identify, analyse and rate the presence and strength of a relationship between two or more sets of information.



Source: ReVelle et al. (1998, pp. 120-121)

Figure 6-5: Typical L-type QFD matrix with several relationships

Adapted from Ficalora and Cohen (2009), Gray and Hughes (2001) and ReVelle et al. (1998), the six 'rooms' of the QFD 'House of Quality' in Figure 6-5 are explained as follows:

- **Room 1: The Whats** – The client's requirements are subdivided into ways that the overall objectives can be satisfied. The requirement is that all of the conditions are listed, including those that are not normally stated, to make sure that no areas are missing. Each of the requirements in the list is ranked for its importance rating to the client. This can be expressed as an absolute, relative or ordinal importance rating. For this research study, 'importance rating' was replaced with 'complexity rating' as the aim is to explore what has been most challenging or critical for LEP participants to achieve. Relative ratings were applied for this research study, which is explained in more detail in **Appendix L1**.
- **Room 2: The Hows** – A list of all the ways of satisfying the Whats to meet the customer's quality measures is recorded across the top of the matrix. This could be measured by all the possible answer categories for a list of closed questions.
- **Room 3: The relationship matrix** – Provides an opportunity to determine the strength of each objective's (Whats) ability to predict the customer's satisfaction with each demanded quality measure (Hows). To do so, the relationship strength of each of the Hows is assessed against each of the Whats on a sliding scale: 0 for no relationship, 1 for a weak relationship, 3 for a medium strength and 9 for strong relationship. The meaning of the shapes in Figure 6-5 is as follows: △=1 (weak), ○=3 (medium), and ⊙=9 (strong).
- **Room 4: Technical assessment** – The scores of each of the Hows multiplied by all the Whats are totalled, from which the most common observations (the high scores) of a particular list of requirements can be seen.
- **Room 5: Competitive analysis** – QFD requires that the importance rating (or complexity rating) is set against an assessment of the competitors' (or benchmark) performance. Therefore, the competitors' products are assessed, and a decision is made as to whether or not the selected product (or group of products) meets or exceeds the competition.
- **Room 6: Gap analyses** – This stage naturally requires considerable research and evaluation, because every aspect of the QFD matrix now has a measurable and visual common goal/observation. Extracting outputs from research and evaluation of previously completed QFD projects helps inform decision-making as to whether any future new building is to be built to the same conditions and quality, or what lessons can be learned in order to achieve a different standard.

Rooms 1 to 5 constitute a basic approach to QFD but Gray and Hughes (2001) note that for this tool to be applied in construction projects effectively, significant data needs to be collected and analysed for Room 6 to be able to benchmark against external organisations. How a QFD matrix may be applied as a research tool for evaluating strategic PPP procurement systems will be explored further in section 6.8.6.

6.8.5 Limitations of QFD

A number of limitations need to be considered when using QFD. The following have been drawn from literature and must be addressed prior to embarking on the QFD analyses.

Govers (2001) points out that although QFD has a mathematical analysis element, a fondness for a logical and quantitative approach can lead to a “mysticism of digits” and doubtful calculations. The completion of the House of Quality is important but may not become an end as such. It runs the risk of getting lost between all conceivable relations. For this reason, it is necessary to never forget that every decision must be taken with reference to the ‘vital few’ concept (as per the Pareto rule).

Often when compiling a QFD project it becomes evident that the information required to fill in the matrix is not available. This applies especially to the WHY and HOW MUCH matrices because by virtue of this approach it becomes clear that benchmark information can be of high importance. In such cases, it will be better to leave them out and to carry on with the core of the House of Quality than to use supposed or pseudo data.

Delgado-Hernandez and Aspinwall (2005) note that the practical use by managers of QFD methods and tools to organise customer needs is still very limited. Despite the successful application of QFD in manufacturing industries, construction organisations are not yet reaping their benefits; this is not unexpected due to the idiosyncratic nature of construction. A possible solution to this situation could be to encourage the application of QFD improvement tools in the construction industry by tailoring the tools and developing software systems to help with their implementation, as has been done in the manufacturing sector.

6.8.6 Methodological approach to QFD for evaluating LEPs

The purpose of research question 4 (Table 6-3) is to come up with a number of substantive and evidence-based hypotheses. They will be based on shared observations and learning points derived at multiple levels in the organisations and based on multiple projects, i.e. six different disciplines involved in 12 selected BSF LEPs. However, they are multi-level only in the extent to which the LEP partners and their supply chains can meet the client’s expectations which are articulated in contracts that have been signed between LEPs and LAs.

Nine major interview survey questions (the ‘value measures’) with which to evaluate opinions about the clients’ key contract performance requirements were formulated and added to the survey questionnaire (as explained in section 6.7.1). The questions were adapted from a comprehensive questionnaire by Akintoye et al. (2000) about research on risk assessment and management of PFI/PPP projects. Following the interpretation of the responses to the questionnaire, collective observations and learning points could be generated, based upon the shared opinions generated from each of the six participants across a number of LEPs.

Hence, research objective 2 consists of two components:

1. Explore how key contract mechanisms are being judged by the participants in strategic partnership procurement systems;
2. Evaluate the collective learning observations to meet clients’ expectations related to the achievement of whole-life VfM and environmental sustainability criteria agreed on projects.

The inputs into the QFD model are limited to: (1) the key contract performance mechanisms (Table 6-16) broken down into specific contract conditions in line with the LEP standard form SPA and, (2) the respondent's judgements about the nine value measures (i.e. responses to nine ordinal questions for each contract performance mechanism in the questionnaire in **Appendix K3**). Hence, the inputs to the QFD model are as follows:

1. A selection of LEPs that predominantly meet or fail the asset value criteria for: (1) whole-life VfM efficiency, (2) cost-effectiveness, (3) environmental sustainability, or (4) collaboration.
2. A list of contract mechanisms required and the most complex elements by the LEP participants.
3. Judgement about conditions within the contract mechanisms by key participants involved in LEPs.

Processing these inputs with the QFD model generates the following outputs:

1. A level of priority of the most complex (i.e. critical or challenging) performance conditions within the contract mechanisms: the WHATs.
2. A benchmark comparison of shared opinion by the selected LEPs about the most complex contract performance conditions against the shared opinion of other LEPs in the market.
3. A comparison of the shared opinion by each of the partners in the selected LEP about the nine value measures: the HOWs.
4. The extent to which shared opinion by the selected LEPs about the nine value measures are shared by multiple disciplines.
5. A level of priority based on the shared judgements of disciplines across the selected LEPs about the value measures in relation to the most critical performance conditions.
6. Competitive assessment reports leading to common observations/recommendations that the LEP participants can learn from collectively to meet contracted objectives agreed with clients. These are prioritised by complexity score and a benchmark score, with the highest scores ranked at the top.
7. A table that shows the competitive assessment reports prioritised by average judgement of the remaining cohort of LEPs about the nine value measures.

The critical competitive assessment reports in point 6 result in a wholly answered objective 2. The necessary material for the conclusions will be brought together with these reports (**Appendix P**) and the discussions made about these statements becomes part of the conclusions in chapter 11.

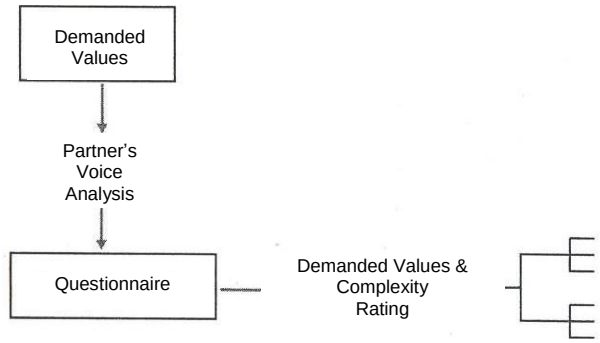
Adapted from ReVelle et al. (1998), the rest of this section will cover the QFD process at a relatively high level of detail. In the context of this research study, some of the major steps of QFD have been replicated, but not all steps. For example, the correlation matrix is not used. A correlation matrix indicates where there is either support from the actions working in concert with each other (the positive relationship) or where they are in conflict with one another (the negative relationship). Figure 6-9 shows an example of a QFD model with a correlation matrix.

Because the QFD process was not strictly followed due to the absence of a correlation matrix, 'QFD' has been replaced with 'Asset Value QFD'. The principles of QFD remain for this research and are based on the first three major steps of QFD. The fully implemented Asset Value QFD matrix along with results and implications is covered in sections 9.4 and 9.5.

Step 1 of the Asset Value QFD covers all activities that focus on understanding the contracted performance obligations (the 'demanded values') agreed between LEPs and LA clients. The

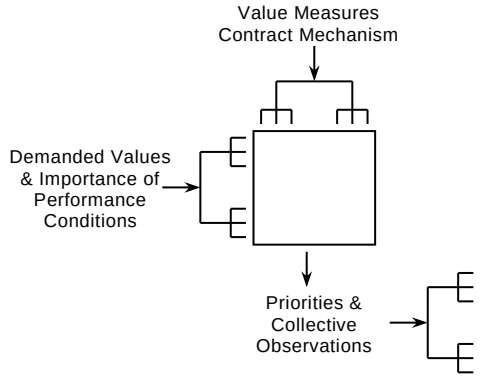
analysis starts with identifying the key contract mechanisms (Table 6-16) and their part characteristics as described in **Appendix G1**. The data produced is refined to the detail of specific performance conditions or elements for each of the contract mechanisms. The outputs for **Step 1** are all the performance conditions as tabled in the questionnaire of **Appendix K3**.

Step 2 involves gathering the voice of each of the partners, including the client, through a survey questionnaire. The purpose of this step is to establish a clear understanding of the intricacies expressed by all six key disciplines involved in LEPs, surrounding the subjective performance requirements of the client. The subjective performance requirements are referred to as the demanded values. Gathering the voice from LEPs and their supply chains allows the researcher to analyse whether they are more likely to meet or exceed the client's expectations (Figure 6-6).



Source: adapted from ReVelle et al. (1998, p. 27)
Figure 6-6: QFD Step 2 – Capturing and analysing the voices

The output of **Step 2** is a prioritisation of the most complex/challenging performance conditions raised by all disciplines. Frequency analyses allow the researcher to rank each condition's relative complexity score for a selection of LEPs and to benchmark this score against the remaining cohort.



Source: adapted from ReVelle et al. (1998, p. 27)
Figure 6-7: QFD Step 3 – Translating demanded values into value measures

The QFD matrix used in **Step 3** translates the demanded values for each participant into value measures of contract mechanisms (Figure 6-7). Value measures are articulated as answers generated from nine questions from a semi-structured survey questionnaire about a contract mechanism. The translation is important because it takes the ordinal answering categories (e.g. Very Poor–Poor–Fair–Good–Excellent–Don't know) and turns them into technical language with which further research can be conducted.

The value measures in **Step 3** are used to prioritise research outputs. Levels of priority are set based on the shared judgements of disciplines across multiple LEPs to meet the most critical performance conditions. For example, which value measures judged by a LA client are equally judged by how many other LEP participants? Also, what do these shared observations say about specific learning points in relation to performance conditions and value measures?

Collective observations can be set for each single participant, but in order to answer research question 4, collective learning points in LEPs need to be articulated, with consideration to any pronounced common observations by multiple key participants. By combining shared learning points for each discipline across selected LEPs, it is possible to compare those with the remaining cohort LEPs to find out whether more or less learning was observed. Averages are separated out for each of the six disciplines and are based upon the fact that 24 different observations (four LEPs per discipline) may vary or may be similar. Similarity means that a judgement is shared by one discipline in at least three selected LEPs. More input assumptions for the LEP evaluations using the Asset Value QFD matrix is in **Appendix L1** and section 9.4.

The logic of the Asset Value QFD matrix

Figure 6-8 is a basic example of an Asset Value QFD matrix, showing the same rooms as in Figure 6-5 (p. 159). It can be populated by following the three steps as described above. To reach a conclusion, a complexity score is calculated with the highest score at the top so as to present a list of evidence-based hypotheses for the delivery of collective observations and learning points by key participants involved in LEPs. Shared learning from a selection of four better- versus four worse-performing LEPs will be compared in section 9.4. This is based on them either meeting or failing a set of asset value criteria for their schools across multiple procurement stages. Limiting the selection to four out of 12 LEPs enables the researcher to separate better- from worse-performing LEPs based on the appraisal of asset-level data while keeping sufficient volume to evaluate shared opinion from LEP-level data.

This data is organised into an L-type matrix, with the partner's key contract requirements (the WHATs) including complexity ratings down the left side of the matrix. The key value measures (the HOWs) are defined in columns across the top of the matrix. In the cells where the rows and columns intersect, the strength of their relationship is recorded. In Figure 6-8, the relationships are categorised as strong (9), medium (3), weak (1) or none (0):

9 = Strong means that ≥66.6% of participants share the same opinion.
3 = Medium means that ≥33.3% and <66.6% of participants share the same opinion.
1 = Weak means that ≥1% and <33.3% of participants share the same opinion.
0 = None means that 0% of the participants share the same opinion.

There are some further nuances to what resembles a relationship strength (e.g. a minimum response rate of 50% and the number of times an opinion is shared by a single participant responding about four LEPs). These are explained in section 9.4 with further detail in **Appendix L**. Further to the methodological approach to QFD and the logic of the Asset Value QFD matrix, an overview of all QFD input assumptions and metadata is shown in **Appendix**

L1-L2. Using the input tables in **Appendix L3-L4**, the QFD process ultimately generates four fully populated matrices in **Appendix Q** (following the AVEM's Plan-Do-Check-Act stages).

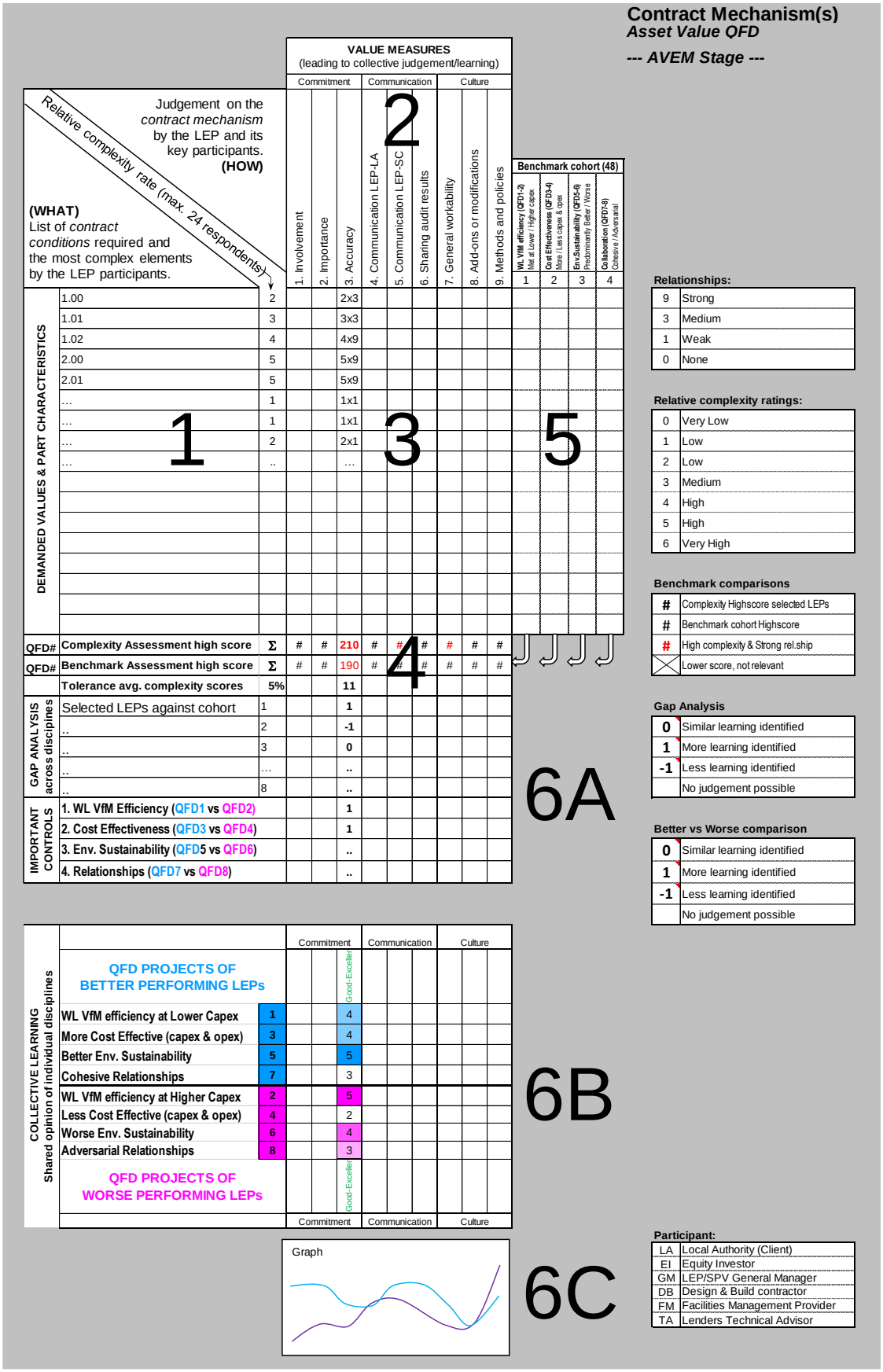


Figure 6-8: Template Asset Value QFD matrix with several relationships

6.8.7 QFD software tool for the built environment

A QFD software toolkit (funded by PeBBu research) was obtained from The University of Reading (Gray, 2005; Gray and Al-Bizri, 2004; Gray and Al-Bizri, 2006). A screenshot of the Main Menu of the original QFD tool is shown in Figure 6-9. The Main Menu of the same software amended to suit this research is in Figure 6-10, without a correlation matrix.

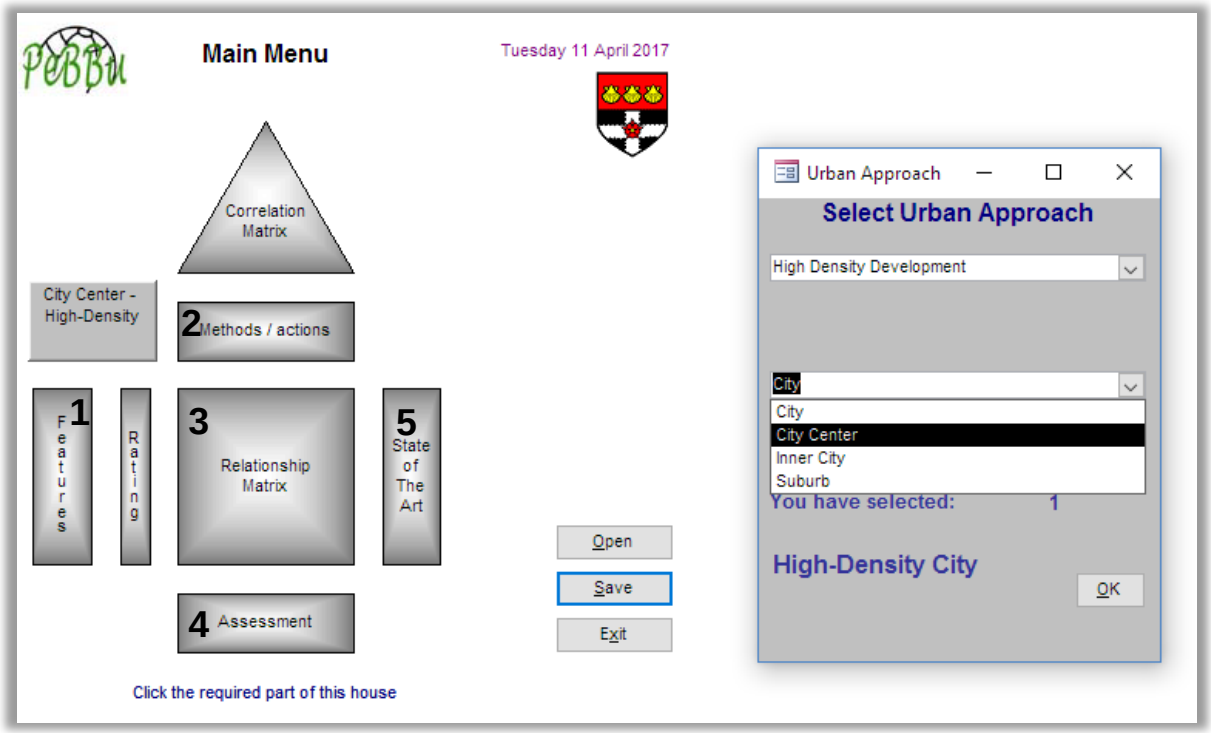


Figure 6-9: Original QFD software for decision support in the briefing of projects

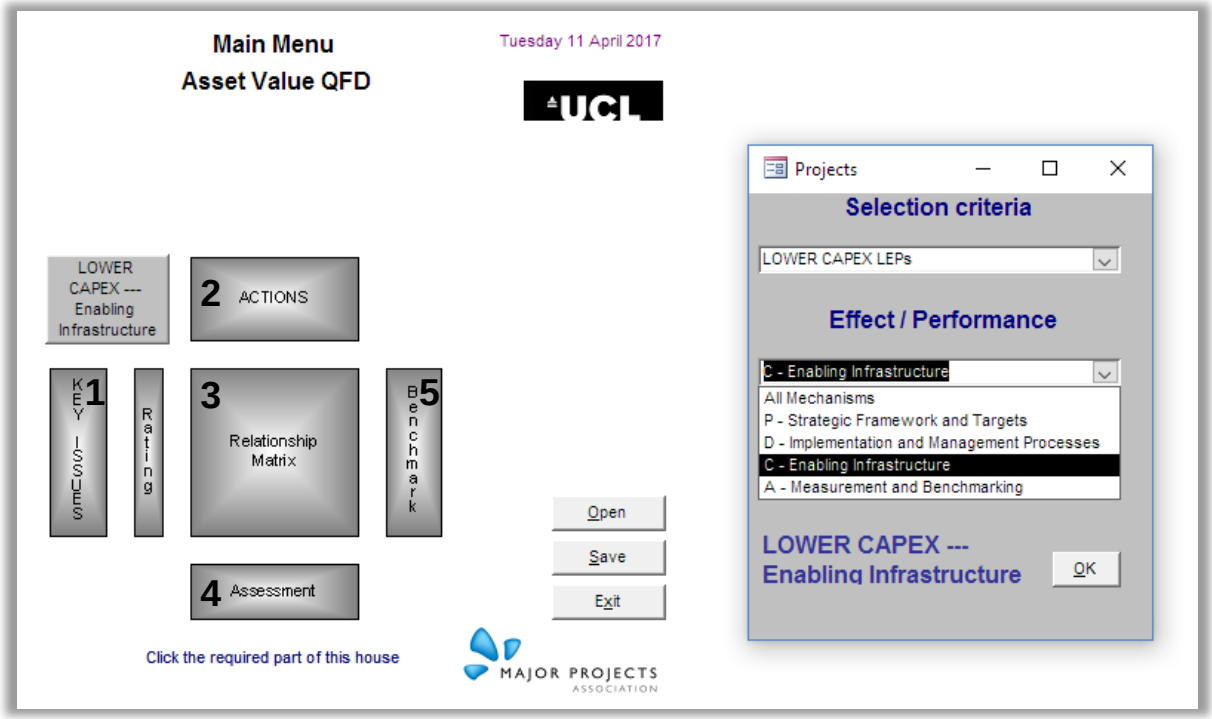


Figure 6-10: Asset Value QFD software for evaluating collective learning in PPPs

Numbering is shown in Figure 6-9 and Figure 6-10 to make a reference to the five rooms explained in section 6.8.4 and 6.8.6. The asset value QFD software can process multiple QFD projects. A limitation of the software tool is that it does not allow for gap analyses between multiple QFD projects. So, analysis 'rooms' 6A, 6B and 6C in Figure 6-8 show how various configurations compare.

Since the QFD software model was previously applied at scale in a built environment context as a project briefing tool, there is no requirement to justify the eligibility for repeated use. The use demonstrates that the QFD software can also be applied as an evaluation tool. This was confirmed by the author of the software as part of the validation exercise (section 6.9). The detailed step-by-step instructions of the QFD software in **Appendix L5** are in line with those of the authors (Al-Bizri and Gray, 2014; Gray, 2005; Gray and Al-Bizri, 2004; Gray and Al-Bizri, 2006; Gray and Hughes, 2001).

The use of QFD software has been shown to be powerful as an evaluation tool for analysing higher volumes of qualitative data generated in support of answering research question 4. The Asset Value QFD takes into account three aspects: 1) prioritising contract performance conditions by their levels of complexity; 2) filtering of common observations and collective learning points; and 3) benchmarking of a selection of data from key LEP participants against the remaining cohort. All three aspects can lead to findings in isolation, as well as compounded. Ultimately, the findings compounded by all three aspects generate the desired result: the critical lessons that organisations should comprehend and remember from strategic PPP procurement systems so as to reduce the risk of making the same mistakes in the future, and for organisations to grow opportunities to stay ahead of others that fail to learn, or learn less.

The full data analysis and interrogation using the Asset Value QFD matrix will be covered in chapter 9. Examples of the various output reports are in **Appendix P** using the QFD software instructions in **Appendix L5**.

6.9 Data protection and ethical issues

Yin (2009) describes four tests that are relevant for establishing the quality of exploratory research. These are: 1) construct validity; 2) internal validity; 3) external validity; and 4) reliability. These four tests were used to ensure the quality of this research.

Construct validity is defined as the process of establishing correct operational measures for concepts being studied (Yin, 2009). Construct validity can be achieved by using multiple sources of evidence (triangulation) and establishing a chain of evidence. Triangulation was achieved methodologically by acquiring data using different methods: interviews, literature review and data mining. Data source triangulation was further achieved by interviewing different participants involved with different LEPs on similar issues to avoid an individually

biased perspective. A chain of evidence was also maintained with the creation of two datasets: one interview database that was created using qualitative data analysis software NVivo and Excel containing the interview transcripts of 69 participants involved in 12 LEPs (section 6.6), and one database containing quantitative and qualitative data of 600 schools built by all 44 LEPs (section 6.5). As will be covered in chapter 9, the analyses of the asset-level dataset (schools) become the input for the analyses of the organisation-level dataset (LEPs).

Internal validity is defined by Yin (2009) as the problem of ensuring that the right inferences are made from interviews and documentary evidence when an event has not been observed directly by the researcher. Firstly, informal discussions were undertaken with researchers at UCL to ensure that data collection instruments were unambiguous. During the LEP-level data collection period, completed survey questionnaires were returned to the interviewee one week after each interview with a request to check if it correctly reflects all the answers provided. Internal validity was also achieved by seeking consolidation of the following research activities:

Validation of research activities				
What:	**Who:**	**Consolidation:**	**How:**	**Remarks:**
Research proposal	All supervisors	Accepted	Hand-in 27-06-2010	
Interview survey protocol	All supervisors	Accepted	Hand-in 07-12-2012	After several revisions
Pilot interview	Vinci Director	Accepted	Meeting 17-01-2013	
PhD upgrade report	All supervisors	Accepted	Hand-in 18-03-2013	After several revisions
School-level data	Teaching Fellow (UCL CPM School)	Accepted	Meeting 19-02-2015	Verify VfM criteria
School-level data	Teaching Follow (UCL IEDE Institute)	Accepted	Meeting 06-03-2015	Verify environmental sustainability criteria
School-level data	Amber Infrastructure	Accepted	Hand-in 22-04-2015	Verification exercise
QFD software model	Lecturer, University of Portsmouth	Accepted	Meeting 02-10-2015	QFD expert
Pre-submission presentation	UCL Bartlett seminar	Accepted	Meeting 11-12-2015	
QFD findings and AVEM	Expert workshop	Accepted	Meeting 23-03-2016	Subject to comments
Final draft thesis	All supervisors	Accepted	Meeting 08-06-2017	Subject to comments

Table 6-23: Validation and consolidation of methodologies

External validity is described by Yin (2009) as defining the limits to which a study's findings can be generalised. Though this research study did not aim for generalisation of findings due to its exploratory nature, some degree of external validity was achieved by presenting general findings at an Industry Expert Workshop on 23 March 2016 (section 9.7) and at events by the industry sponsor, Major Projects Association (MPA) to obtain feedback from the audience attending. MPA presentations were held on 14 November 2013, 5 November 2014 and 27 April 2016. Publications were generated and presented at conferences in Sydney and Newcastle (Australia), London, and Toronto and a journal paper was published to make academic arguments emerging from the literature (page xvii and the **CD Appendix**).

Reliability is described as the degree to which the same findings can be obtained if the same research is repeated (Silverman, 2011; Yin, 2009). Yin (2009) suggests that reliability in qualitative research can be achieved by using a protocol and developing a database. It can also be achieved when the research process is transparent and provides sufficient detail about the research strategy and data analysis methods are provided (Silverman, 2011). Therefore,

an interview survey protocol was used (**Appendix K2**) along with datasets of all metadata (**Appendix J1 and J2**).

The study was performed at UCL and directed by the chair of the Bartlett School of Construction and Project Management. The involvement of the MPA as sponsor in this research was purely based upon their interests in the outcomes of this project. The collaboration encompasses financial as well as network support. The collaboration with the EFA and CHP is by means of data sharing under a strict confidentiality agreement.

A letter of support (**Appendix B1**) was sent by the EFA Head of Programme Delivery to encourage market parties to cooperate with the interviews. All 69 respondents to the interview survey, the EFA, MPA, and the panel of experts invited to the expert workshop on 23 March 2015 could receive the conclusions and a summary of this final thesis.

Due to the confidential nature of specific information, certain details cannot be revealed, such as names of interviewees/companies in relation to project aspects and judgements. A list of the organisations that have participated included in **Appendix K4** shows those that requested for a Non-Disclosure Agreement to be signed. Assurances on secure data storage and destruction upon completion were also upheld throughout as only the researcher had access to the password- and encryption-protected computer on which raw data was digitally stored. This raw data will be safely destroyed after completion of the research.

Ethical issues

Ethical considerations must be made when designing a research study, especially as it may involve dealing with confidential information about an organisation or participant. Ethical considerations include informed consent, review board approval, confidentiality, handling of sensitive results, inducements and feedback (Runeson and Höst, 2008). In line with this, ethics procedures, guidelines and conduct in relation to confidentially, anonymity and integrity as stipulated by the UCL were adhered to[34]. As part of the project Ethics in Built Environment Research, this research was presented on 27 March 2015 during a seminar of ethical issues – both practical and conceptual – encountered by PhD students from across the UCL Bartlett Faculty of the Built Environment.

Ethical risks during research mainly pertain to the controversy about the BSF legacy Labour policy that was heavily scrutinised and subsequently terminated by the then elected coalition government that followed in 2010, and continues to be criticised by the current Conservative administration (see chapter 1 and section 2.5.2.1). Directly related to this risk are the multiple Non-Disclosure Agreements (NDAs) signed relating to commercially sensitive information, anonymity of organisations and individuals within them. Given that NDAs were signed, there was no need to put forward an application with the UCL Research Ethics Committee.

[34] Research ethics at UCL: https://ethics.grad.ucl.ac.uk/ (visited: Jan-2015)

6.10 Summary of chapter 6

This research study was subject to a multitude of challenges. Significant cutbacks to public sector services following the global financial crisis in 2008 to 2010 resulted in the cancellation of the BSF programme. This in turn placed more pressure on the schools, the LAs and the private sector organisations to make the LEP model work as was originally envisaged. Consequently, this influenced the methodological approach because of the policy changes in organisation and tendering and due to the broader political and economic circumstances which prevailed during the period from 2010 to 2016. Given the complexity of the numerous external challenges which threatened to undermine the research, by adopting a pragmatism approach, it was possible to adjust the research direction to accommodate these events. Moreover, the paradigm of abductive pragmatism can be justified, while some aspects of the analysis could be described as cursory, given the scale and breadth of the research objectives.

Chapter 6 explained and described the methods to examine the performance of social infrastructure assets and to evaluate collective learning in strategic partnership procurement systems responsible for these. By exploring issues faced by key participants involved, extended phenomenological research can provide better insights into the effectiveness of policy requirements for strategic partnership procurement investment vehicles in the UK such as LEP, LIFT and hub companies.

First, the chapter positioned the research study in its theoretical context. Second, it justified the use of a mixed method to meet the research objectives. Third, the chapter described and explained the data sources, sampling strategies, and data analysis tools. Regarding actual data collection, the use of multiple data collection methods, i.e. MCA, semi-structured survey interviews and documentary review during the study, were highlighted. Finally, the criteria for judging the quality of the research data, analysis tools (QFD) and results were outlined. These discussions also considered issues of validity and reliability, and how ethical standards and confidentiality were maintained throughout the study.

Chapter 7 will propose a conceptual learning framework adapted from existing theoretical models, to be able to examine the case of the BSF LEP procurement model. The proposed framework needs to be generic so it can be applicable to evaluate the effectiveness of any form of strategic partnership procurement (not just LEPs), so long as there is access to information and resources about a portfolio of projects.

Chapter 7 – Developing a conceptual learning framework

7.1 Overview

This chapter brings together a background of social infrastructure and societal challenges of climate change contextualised to strategic PPP procurement systems discussed in chapter 2, strategic procurement literature reviewed in chapter 3, viewed through the theoretical lens of organisational learning and collective learning as discussed in chapter 4. The research paradigm, strategy and methods were explained and explored in chapters 5 and 6.

The aim of this chapter is to develop a collective learning framework in the context of strategic PPP procurement systems. A conceptual framework is of need for academia, policymakers and industry to explain and debate at what point(s) the collective learning achieved in a strategic PPP procurement system creates an opportunity for changes (incremental or radical), and under what circumstances any observed lack of collective learning becomes disruptive to improve both the intrinsic and economic performance of its assets.

It is necessary to commence the discussion by explaining the underlying logic of the proposed conceptual learning framework. The next three sections – 7.2, 7.3 and 7.4 – review the literature of organisational learning in the context of strategic partnerships in construction. Existing models available are discussed, related and intertwined with the generic concepts discussed in chapter 4. Much has been written about organisational learning, but only since the mid 1990s have scholars started to gauge and capture what capabilities construction-related organisations should possess to be successful. A holistic overview of the body of theory and techniques is discussed and related to strategic partnership procurement systems for construction, starting with TQM (Oakland, 2014; Oakland and Marosszeky, 2006), followed by Morrison and Mezentseff's learning alliances framework (Morrison and Mezentseff, 1997), Deming's Plan-Do-Check-Act improvement cycle (1950s), the model for construction alliances (Love et al., 2002), and the continuous improvement model (Cheng et al., 2004).

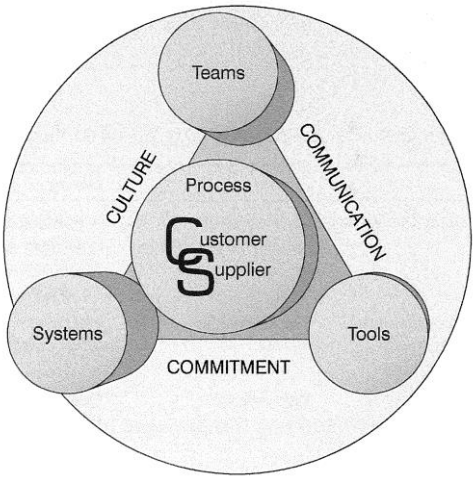
Section 7.5 describes and analyses another learning framework adopted for projects procured through LIFT to achieve continuous improvement in long-term relationships. In section 7.6, a conceptual learning framework is discussed that is adapted from different existing theoretical models and contextualised to strategic PPP procurement systems in construction. Finally, a logical composite model is discussed, called the AVEM. The model not only takes into account organisational learning and its ancillary field of collective learning, but also other theoretical strands, namely that of risks, profits and benefits of complex procurement systems, and its associated hybrid (often temporary) project organisations. The last section, 7.7, will see other frameworks adopted with LIFT, and the adoption of the learning framework to PPP procurement systems that are based on a portfolio of projects (as opposed to a single project) such as LEP, LIFT or hub companies, or bundled PFI/PF2 project organisations.

7.2 Total quality management

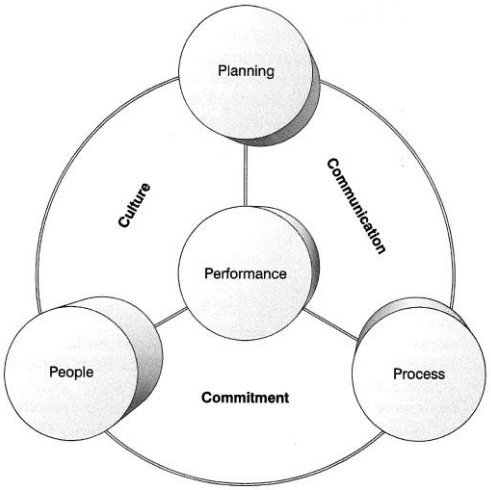
TQM is an approach to improving the competitiveness, effectiveness and flexibility of an organisation by optimising the quality of each part of it. It is a way of planning, organising and understanding each activity in an organisation and the people that work in it. It depends on each individual at each level with shared responsibilities, to deliver an effective and efficient organisation to the highest quality to the customer. TQM encourages people to eliminate wasted effort by bringing everyone into the process of improvement, so that the best results are achieved in less time (Oakland, 2014, p. 35). There are multiple definitions of TQM, some of them are set out below:

- A shared collaboration in a company aimed at producing VfM products and services in order to meet and surpass customer needs and expectations (Dale et al., 2016).
- A philosophy aimed at improving all facets of an organisation in order to meet and surpass customer expectations (McIntyre and Kirschenman, 2000).

In the 1980s, Deming, Juran and Crosby developed the original TQM framework, shown in Figure 7-1, based on origins from manufacturing (Dotchin and Oakland, 1992; Garvin, 1986).



Source: Dotchin and Oakland (1992)
Figure 7-1: Original TQM model



Source: Oakland and Marosszeky (2006)
Figure 7-2: Revised TQM model

Since the 1980s, TQM has been widely promoted in the UK and other parts of Europe to a large range of sectors for both the production and services industries. The original framework brings together a number of quality components including teams, processes, quality control tools and quality assurance systems (e.g. ISO 9001). It was recognised that culture plays an important role in the success of organisations, as well as good communication and commitment, not only from management but everyone. Customer/supplier chains were the core of the TQM model. During the 1980s and 1990s, many businesses and organisations found the model useful as a simple framework as it was easy to apply to a business or organisation strategy. Harrington et al. (2012) point out that the construction industry has tended to confuse TQM with quality control and quality assurance, believing that compliance with quality assurance standards such as ISO 9001 and 9002 is all that there is to the

application of TQM on construction projects (Jaafari, 2001). Quality control and quality assurance are applied during project implementation while TQM is a strategic philosophy adopted by an organisation and implemented on a continuous basis, even if the organisation is waiting to perform a new project (Harrington et al., 2012).

7.2.1 TQM in construction

From the beginning of the 1990s, many government departments and business organisations initiated visionary reports, such as the Latham report (Latham, 1994) and Egan reports (DETR, 1998; Strategic Forum for Construction, 2002) in the UK. As was discussed in section 2.3, these reports were critical of the construction industry for its poor performance and history of waste and rework, along with low levels of customer satisfaction and poor supply side integration. Oakland and Marosszeky (2006) recognise that the construction industry was facing similar quality dilemmas as manufacturers were having in the 1980s. In the 1990s, construction industry leaders could see benefits of adopting successful management practices from other sectors (Hellard, 1993); however, because the construction sector is so different, it was very hard to make the connection. Construction organisations should realise that results cannot be gained overnight and that an organisation needs time to adapt, change, and learn (Pheng and Teo, 2004). In the 2000s, Oakland and Marosszeky (2006) pointed out that the construction industry has a unique approach to production: the built assets are idiosyncratic and highly complex; the supply chain is fragmented; and it has complex engagements with its clients during the whole asset life and as a result its processes are different. In 2006, Oakland introduced a theoretical model (Figure 7-2) that demonstrates how the concepts of TQM can be leveraged to benefit organisations involved in construction.

The revised TQM model by Oakland aims at improving organisational Performance through better Planning and management of People and Processes in which they work. The core of the model was performance in the eyes of the customer, but this is now extended to include performance measures for all stakeholders involved. This core is surrounded by Commitment to quality and meeting customer requirements, Communication of the quality message, and recognition of the need to change the Culture of most organisations to create total quality and operational excellence. The three Cs are the ‘soft foundations’ which encase the ‘hard management necessities’ of the four Ps (Oakland, 2014).

Harrington et al. (2012) conclude that to date there has been a slow change-over from quality control to TQM. In addition, they observe that there is a lack of good research for improved approaches. The authors also conclude that a focus on process and measurement would greatly accelerate reductions in cost, defects and time delays. Partnering approaches have a positive impact on project performance, in terms of cost growth, schedule growth, change order cost, claims cost and value engineering savings for these projects. The authors believe that the results could be different and the impact more positive if a more ‘genuine’ partnership takes place at the project onset.

7.2.2 Implications of TQM in construction

Harrington et al. (2012) point out that while TQM could be a solution for the construction industry's problems, some of these problems are themselves obstacles to implementing TQM. A number of these common implications are set out below:

- The barrier caused by traditional or conventional practice;
- The long-term nature of a successful TQM implementation also creates a major problem, especially in the construction industry. A sudden change of the market (e.g. global financial crisis) or a different political regime dries up the pipeline;
- The construction industry is known for its fluctuations, which has the effect of making construction firms reactive rather than proactive;
- Changing an organisation's culture is a very difficult task, which often faces resistance. The challenge of implementing TQM results from the fact that TQM is not a slogan, nor a tool, nor a programme: it is an organisation paradigm;
- Among the other difficulties in implementing TQM is the failure to have some means (systems, tools, procedures) of monitoring and managing the overall progress of the TQM implementation;
- The failure to provide training skills immediately before TQM is to be applied;
- Finally, regarding TQM only as an internal process and thus failing to involve suppliers, subcontractors, and others in the process chain creates a major difficulty in implementing TQM.

Many companies considered adopting TQM in the 1990s and 2000s; however, interest has since dropped. In particular, the construction industry is divided (Delgado-Hernandez and Aspinwall, 2005). According to Love et al. (2000a), it is evident that various construction organisations are still reluctant to implement TQM in their projects because it is not uncommon for them to consider TQM to be synonymous with quality assurance. Delgado-Hernandez and Aspinwall (2005) cite Pheng and Ke-Wei (1996), who note that quality assurance is a management process aimed at increasing confidence in a product or service by achieving quality objectives set out in writing, but it is normally associated with paperwork and bureaucracy. Since the early 2000s, the construction industry started to recognise the importance of TQM and quality became a primary construction goal (Lahndt, 1999). Delgado-Hernandez and Aspinwall (2005) point out that the improvement tools being applied in the manufacturing sector should be adapted and used in the construction industry. However, interest in TQM has dropped in recent years, as can be demonstrated by the Google Books graph[35] in Figure 7-3.

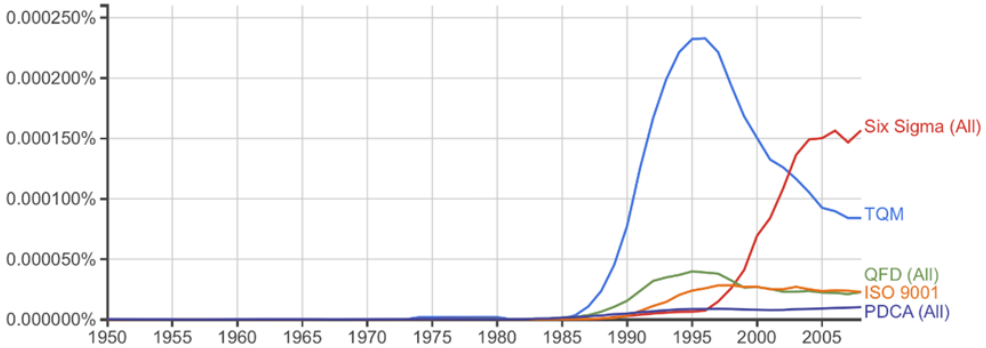


Figure 7-3: Google Books frequency search of terms in literature in the UK

[35] Website Google Books: https://books.google.com/ngrams (visited Mar-2016)

Problems and errors that arise during procurement stages offer opportunities to learn and improve (Delgado-Hernandez and Aspinwall, 2005). One of the main objectives of TQM (part of the philosophy of which is continuous improvement) is to increase customer satisfaction (Chua, 2003). It requires commitment to consider customer viewpoints at each stage in the procurement process. Harrington et al. (2012) note that TQM in construction would be greatly enhanced with more focus on 'lean' concepts including work simplification of lean tools and methods application. The notion of lean techniques, Six Sigma or just-in-time production systems are not discussed further in this thesis; however, it is recognised that all have strong affiliations with TQM and continuous improvement.

7.2.3 TQM and continuous learning organisations in construction

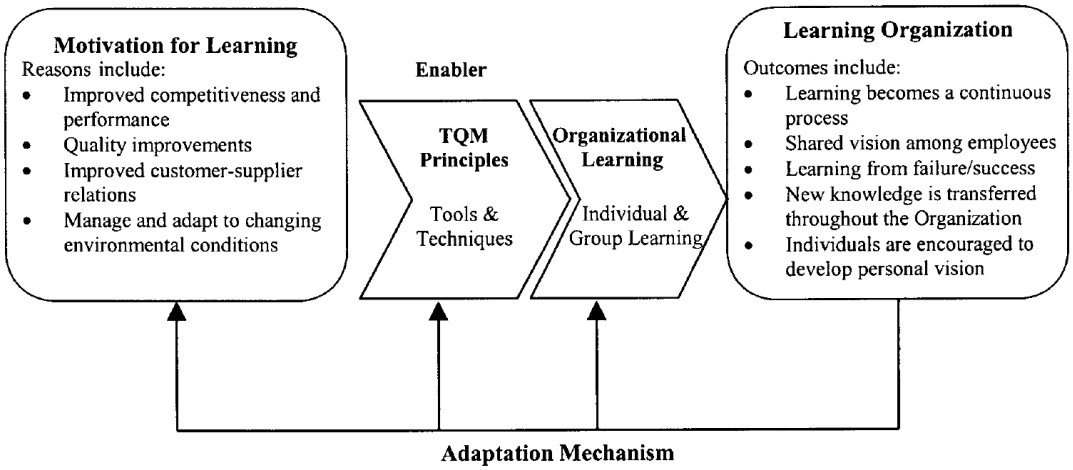
According to research by Love et al. (2002), construction organisations should consider developing long-term alliances so as to enable parties to form learning alliances. An inter-organisational model is proposed to support learning and is founded on the principles of TQM. However, TQM has not been well received by the construction industry. As discussed before, it was perceived to be synonymous with quality assurance. Love et al. (2000a) argue that as a result, organisations involved in the construction industry have historically not progressed continuous improvement initiatives and as such the potential for learning has been inhibited.

Morrison and Terziovski (1998) suggest that if TQM is practised as a philosophy as well as a set of techniques (such as benchmarking, performance measurement, or QFD) it can then be used as an enabler for creating a learning organisation. Therefore, if construction organisations are to become learning organisations, TQM could be used as the means to achieve this. Ideas of continuous learning allied to concepts such as empowerment and partnership, which are facets of TQM, also imply that a change in behaviour and culture is required if construction organisations are to become learning organisations.

The basic philosophy of TQM is applicable to any organisation, regardless of the type of industry (Kelada, 1996). For continuous improvement to occur, the process of learning should take place in a series of stages with quality acting as an enabler for change (Buckler, 1996). Moreover, the prescriptive approach offers little practical advice about what and how learning processes are to be re-engineered and how previous knowledge is to be utilised in the new process via feedback loops.

The relationship between TQM and the learning organisation has been suggested by a number of authors (Barrow, 1993; Cheng et al., 2004; Cicmil, 1997; Love et al., 2002; Love et al., 2000a; Love et al., 2000b; Senge, 1990). Besides, Garvin (1993) sees a clear philosophical link between systematic problem-solving of a learning organisation and TQM. Garvin (1993) states that if TQM is practised as philosophy (e.g. Plan-Do-Check-Act continuous improvement cycle) as well as a set of learning techniques (e.g. double-loop learning), then it can be an enabler for organisational learning at both individual and group levels.

In the late 1990s, it was observed that senior management in construction organisations needed to recognise TQM as an enabler that could be used to cultivate continuous change and learning (Love et al., 1998b). If the construction industry was to improve its performance, organisations operating in the industry should be willing to learn. A TQM philosophy can be used as a framework for organisations to develop a fully shared, even synergistic understanding of information, experiences and goals of all individuals within the organisation so that change can be consciously and proactively managed. Figure 7-4 presents a conceptual model by Love et al. (2000a) of a learning organisation in construction.



Source: Love et al. (2000a, p. 327)

Figure 7-4: Conceptual model for a learning organisation in construction

While Luthans et al. (1995) recognise the importance of TQM in the change process, they suggest that organisations need to move beyond TQM and embrace the concept of organisational learning if they are to adapt to their environment and therefore improve their future performance. If organisations in the construction industry are to become adaptive and responsive to the environment, then they could re-think their approaches to quality so that learning can become an organisational norm. Moreover, this may require the industry to revisit their approaches to organisational survival, strategy development and organisational change. Love et al. (2000a) argue that simply repeating strategies that have failed is not a useful exercise, but it is something the construction industry often tends to do. Thus, like in manufacturing, organisations in construction may need to embrace double-loop learning so as to challenge the underlying concepts, paradigms and the visions that have determined their way of thinking in the past, in examining models of action. They conclude that if the construction industry is to improve its performance, those organisations involved must learn from their mistakes and adapt to the changing environment. If TQM is to be implemented, organisations may well have to unlearn first, that is, change their existing paradigms and mind-set so that TQM practices become a part of organisational life. Only then can innovative management concepts derived from manufacturing be implemented successfully. Prior to the cancellation of BSF, the construction industry bidding for LEPs was encouraged to set out their approach to continuous improvement in the Outline Business Case (**Appendix C1**, Figure 2). Multiple '4ps Gateway Reviews' (**Appendix E1**) were facilitated by an independent review

team to capture via workshops and interviews what was learned and assess if new projects prepared by LEPs were ready to move to the next stage in the process (4ps and PfS, 2008). Standard BSF policy documents encouraged the use of TQM (e.g. KPIs, Continuous Improvement Targets and a Cost Benchmarking Procedure). Based on feedback received from LEPs that participated in this research study, mixed opinions were received about the effectiveness of these policy documents. Chapter 9 will cover the analyses of these in detail.

7.3 Collective learning and continuous improvement in construction

Continuous improvement can be seen as a long-term change process (Atkinson, 1994; Barlow and Jashapara, 1998). It is defined as an organisation-wide process of focused and ongoing incremental innovation (Bessant et al., 1994). These are a number of definitions by scholars:

Suzaki (1987)	"incremental improvement of products, processes, or services over time, with the goal of reducing waste to improve workplace functionality, customer service, or product performance".
Bessant et al. (1994, p. 18)	"a company-wide process of focussed and continuous incremental innovation sustained over a long period of time".
Juergensen (2000, p. 3)	"improvement initiatives that increase successes and reduce failures".

These definitions have in common the notion that continuous improvement is multifaceted and extends across several organisational development initiatives. Although the concept is clear, because of differences in interpretation and understanding, the implementation of TQM and continuous improvement shows a wide diversity. Nonetheless, the concept is concerned with an effort to upgrade the performance of every facet of an organisation and covers more than simply improving the quality of the (built) products. A common understanding and clear interpretation with explicit tools and techniques are essential for a meaningful chance to embed it in the culture and practices of the construction industry.

In the TQM concept, the use of the Deming cycle refers to long-lasting success in improving quality (Kaye and Anderson, 1999) because of its systematic process of improvements by reflection and learning in practice. It is a key component in the framework model for re-engineering construction projects as described by Love and Li (1998), being a concept embodied in TQM. With respect to strategic partnering, continuous improvement is a driving force for implementing partnering goal evaluation and problem resolution (Cheng and Li, 2002). Construction parties committed to continuous improvement are inclined to the formation of long-term relationships with others, striving for improvement of project performance as well as internal organisational practices. In BSF LEPs, the private sector was to bring commitment to partnership, continuous improvement, development capital and SCM. In return, the public sector would offer to the LEP a long-term programme of investment, exclusivity, repeat business and a role in new project development (4ps and PfS, 2008). The reality was that, even before the demise of BSF, a number of LEPs and their LAs failed to commit to these

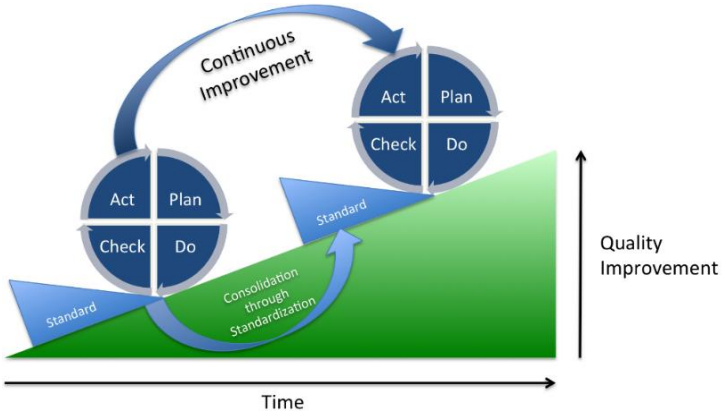
principles while others have been very successful. Again, analyses of this will be covered in detail in chapter 9, to find out how effective the LEP model has been.

7.3.1 Embedding collective learning

As referred to at length by Love et al. (2002), many businesses in the construction industry are unsure how best to strive to become a true learning organisation. The learning types mentioned above involve incremental and adaptive learning focused on changing routines and learning about learning through revealing and altering the tacit infrastructure of thought. The problem grows when different levels of learning are aggregated – individual, group and organisation-wide – and the problem of knowledge types – explicit and tacit – as explained by Nonaka (1991). Considering the above, Love et al. (2002) suggest that for construction alliances (like LEPs come close to) to improve customer satisfaction, the parties involved must be able to learn collectively because of their long-term cooperation and sharing of risks and profits. Essentially, the concept of the learning organisation provides a paradigm for collective learning. The most successful organisations are in fact learning organisations that critique their actions to improve their performance and customer's satisfaction regarding the product or service delivered. So, LEP participants need to learn collectively for LEPs to be successful. If an individual leaves the organisation, the knowledge acquired remains in it. In a learning organisation, teams develop knowledge by working as a unit (Love et al., 2002). Organisations involved in construction can rely on management tools to develop the learning disciplines, which are identified by Senge: personal mastery, mental models, shared vision, team learning, and systems thinking, all of which can institutionalise the learning habit (Love et al., 2002). The need for collective learning was not at all identified in BSF policy both at the LEP level and on individual projects. Strategic incentives for lessons learned were limited to national programme-level only.

7.3.2 Embedding Deming's continuous improvement cycle

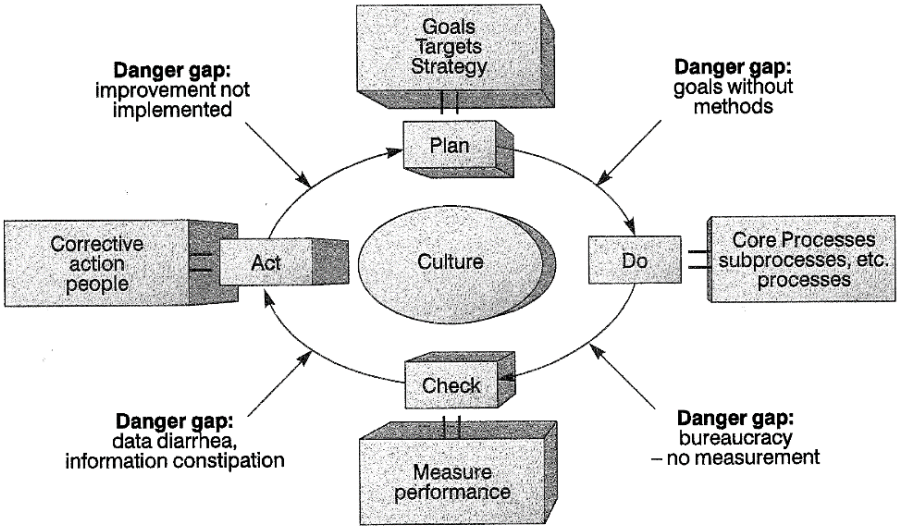
The PDCA cycle in Figure 7-5 can maintain any improvement and prevent deterioration. Gray and Davies (2007) explain that continuous improvement is the current mantra and implies that there is a continuous process to look for improvements in the whole of the activities of the firm.



Source: Wikipedia.org, 2016

Figure 7-5: PDCA continuous improvement cycle

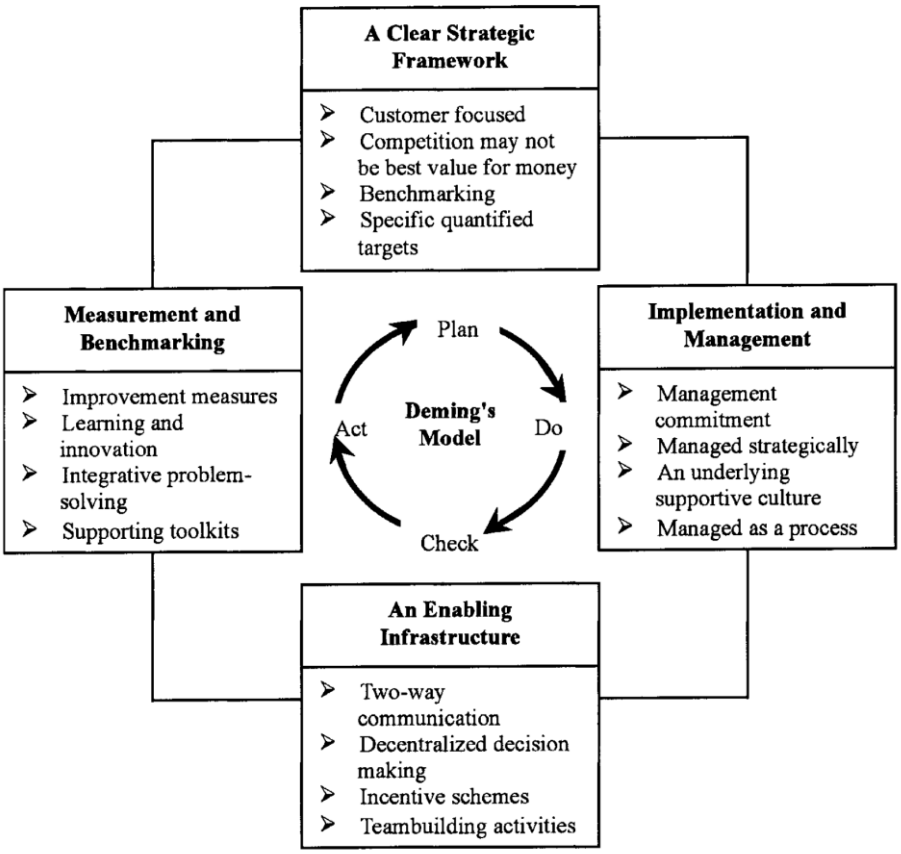
The revised TQM framework by Oakland (Figure 7-2) introduced in section 7.2 can be implemented using Deming's continuous improvement cycle, by connecting each stage of the PDCA cycle with an aspect of the TQM framework (the four Ps), as illustrated in Figure 7-6 (Oakland, 2014).



Source: Oakland (2014, p. 366)

Figure 7-6: TQM implementation using Deming's cycle

With consideration of the above viewpoints, Cheng et al. (2004) created the continuous improvement model for strategic partnering in construction, as shown in Figure 7-7.



Source: Cheng et al. (2004, p. 60)

Figure 7-7: Continuous improvement model for strategic partnering in construction

The model has put two fundamental structures into practice. On the one hand, it embodies Deming's model (i.e. a Plan-Do-Check-Act cycle) to propel continuous improvement (Schultzel and Unruh, 1996). On the other hand, it highlights four major frameworks of reference for continuous improvement.

PLAN – Clear strategic framework and targets

Top management should treat planning as a strategic affair and identify what is to be achieved. These plans and goals should be in line with the organisations' plans and goals, and, when necessary, should be written as part of the organisational missions (Hoffmann, 2005; Ibrahim et al., 2010; Lundin and Söderholm, 1995). The Construction Industry Board (1997) determined some critical aspects for continuous improvement as follows:

- focusing on customers' need, value-adding activities and waste elimination;
- admitting that competition is not the only way to achieve best VfM;
- aiming for benchmarking the best practices;
- identifying specific quantified targets, monitoring progress and measuring performance.

DO – Implementation and management processes

Implementing a plan and regularly reviewing and checking against what has been done cannot be accomplished without management commitment to processes and procedures, a prerequisite to continuous improvement. Cheng et al. (2004) highlight a number of concerns:

- Management conveying total commitment to satisfying all stakeholders governs any action and decision (Atkinson, 1994).
- It should be managed strategically so it becomes one of the core elements to take care of.
- It should be embedded with an underlying supportive culture so that its importance and value are well re-organised by everyone in the organisation.
- It needs to be managed as a process that can accommodate the PDCA cycle.

CHECK – An enabling infrastructure (systems and mechanisms)

To check that objectives are being achieved, Cheng et al. (2004) point out that an enabling infrastructure such as systems and mechanisms that underpin the performance of the underlying assets in the strategic partnership has to incorporate two-way communication and decentralised decision-making. In addition, performance incentive schemes and team-building activities are also major enablers.

ACT – Portfolio measurement and benchmarking

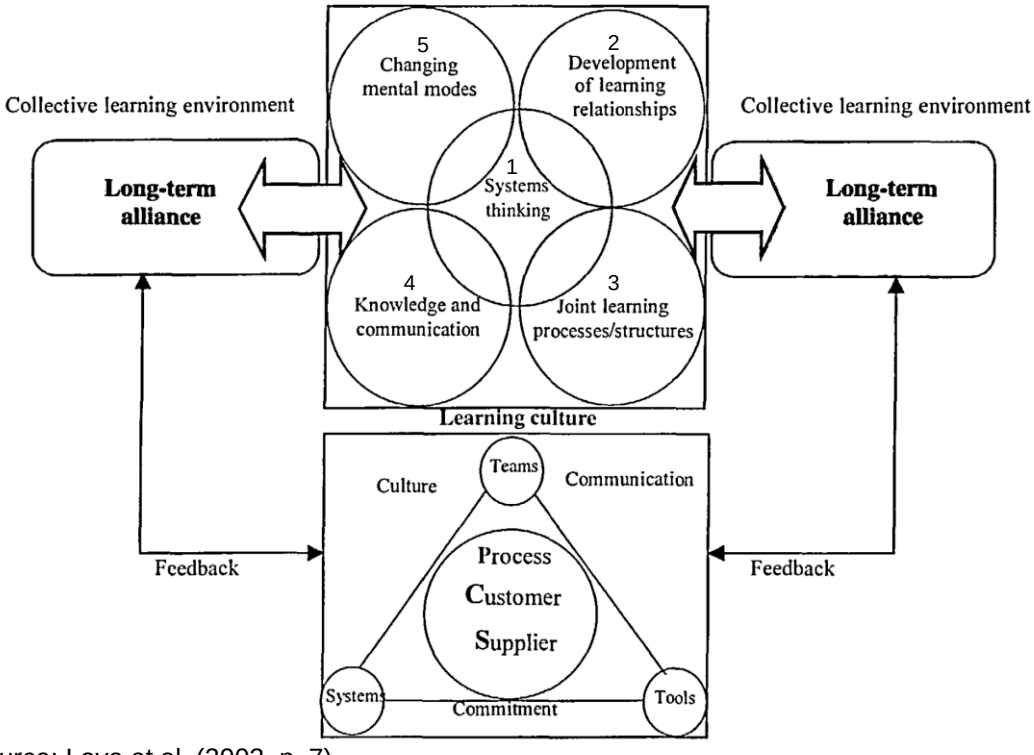
Improvement corresponds to the actions for a set of goals that have to be measured and benchmarked (Honecker et al., 1999). An integration problem-solving component for portfolios of assets has to be added to achieve the goals that have been pinpointed. It would appear that the availability of a supporting toolkit (a set of common reporting templates, performance monitoring tools and training programmes) is of great benefit in assisting directors and management to implement continuous improvement (Chapman and Hyland, 1997). Moreover, in order to enhance the capability of the teams, a learning and innovation perspective has to be introduced to propel the benchmarking activities (Cheng et al., 2004). The ability to amend by taking corrective action and then evaluate, rather than the easier option of starting a new

PDCA cycle without evaluation, will lead to a never-ending improvement helix (Oakland and Marosszeky, 2006).

7.4 Strategic alliances and collective learning

One benefit of organisations involved in construction developing long-term strategic alliances or partnerships is to enable parties to form learning alliances (Love et al., 2002). Long-term alliances aim to incorporate a learning environment that encourages mutual understanding and benefits from the relationships. With this in mind, such alliances should essentially be viewed as learning alliances as the relationship appears consistent with those of a permanent learning organisation (Morrison and Mezentseff, 1997).

Love et al. (2002) have introduced a learning model for construction alliances, as shown in Figure 7-8. It is founded on the original principles of TQM (section 7.2) and an integrated supply chain, as illustrated in the lower part of the model. The essential components of the upper part of the model resemble a learning culture: systems thinking; knowledge and communication; changing mental modes; joint learning structures/processes; and development of learning relationships. This sub-model is adapted from Senge's five learning disciplines (Senge, 1990) and a learning framework proposed by Morrison and Mezentseff (1997). The former is institutionalised for the strategic construction alliance. The individuals within the organisations that make up the alliance learn how to learn together (e.g. inter-organisational teams). Mechanisms, such as those ingrained within the alliance (e.g. customer–supplier focus and benchmarking performance, which are components of TQM), can allow a collective learning environment to take place (Hill, 1996; Nesan and Holt, 1999).



Source: Love et al. (2002, p. 7)

Figure 7-8: A learning model for construction alliances

The components of the upper sub-model are described below.

7.4.1 Systems thinking in construction alliances

The notion of systems thinking was already explained in section 4.6. This form of thinking has a systemic and holistic focus, and will easily facilitate collective learning within alliances. Systems thinking involves adopting a holistic rather than fragmented approach to problem-solving, concentrated on understanding how relevant factors collectively interact to give rise to a problem. Within a TQM environment, systems thinking can be used to develop strategies for relationship building between customer and supplier (Oakland, 2014). The original TQM framework (lower sub-model in Figure 7-8) puts emphasis on establishing an environment whereby partners attempt to become process-focused (effects of teams, systems and tools related to commitment, communication and culture between customer and supplier). This can enable benchmarking to be used as a feedback mechanism, with respect to performance (Li et al., 2001). Feedback processes provide information about what has to be learned as well as what has been learned similar to the double-loop learning principle. Benchmarking can be used to provide financial (business performance), technical (productivity measures) and efficiency (human contribution measurement) indicators for comparing the performance of multiple alliances over time (Love et al., 1999). It should be viewed as an operational process of continuous learning and adaptation that results in the development of an effective alliance (Li et al., 2001; Love et al., 1998a). Participants involved within the alliance need to have an understanding of how its subsystems are interconnected, and how they can individually influence the quality of the final product or service. This enables parties to see relationships between issues, events and information as a whole or as patterns, not as unconnected parts.

7.4.2 Development of learning relationships

The effectiveness of supply chains in long-term partnerships depends on how learning is stimulated. Building learning relationships becomes laborious when individuals involved have a firm commitment to their own organisation, their own personal agendas and unique mental model of the situation (Morrison and Mezentseff, 1997). This may create complex responses to different changes. Thus, there is a need for senior management to encourage and assist with the development of the relationship (Senge, 1990). At an inter-organisational level, Newcombe (1999) suggests that strategic partnering can maximise learning between construction organisations. Love et al. (2000b) advocate that learning lies at the genesis of partnering. Since it involves reactivation of partnering for a portfolio of projects, it is essential when forming new partnering teams that participants accumulate experience, are committed to continuous improvement, and are aware of the importance of a learning climate (Cheng and Li, 2002). Roehrich and Lewis (2014) suggest that managers should consider the manageability and enforceability of complex contracts in combination with the formation of inter-personal relationships and simplified working agreements in their organisations.

7.4.3 Joint learning processes/structures

To support a learning climate within an alliance, joint learning structures, strategies and processes need to be developed (Morrison and Mezentseff, 1997). This involves designing appropriate and attractive reward and incentive systems that motivate individual learning, which in turn facilitates joint learning. Joint learning within the alliance may enable participants to develop shared visions that project to future technological advancements, management innovations and new products and services. In essence, an alliance that incorporates shared learning encourages a strong foundation for a relationship built on a set of influential factors including mutual trust, long-term commitment, continuous improvement and common goals (Cheng et al., 2000).

7.4.4 Knowledge and communication

Time for reflection on the outcomes of learning is essential in order to turn tacit experience into explicit knowledge (Schön, 1983). Critical to collective learning is the building and sharing of existing and new knowledge by the organisations involved and continuously communicating and reflecting on all actions and outputs. Nonaka (1991) suggests that sustaining long-term success relies much on the possibility to initiate technological innovations that help transmit the knowledge as widely as possible (in the tight network that a LEP in fact is). This makes knowledge creation and communication valuable components of the framework which need to be constantly monitored and extended by senior management (Love et al., 2002).

7.4.5 Changing mental models

This aspect was previously described as part of Senge's learning disciplines in section 4.5. The process involves incremental changes in mental modes, which accumulate over a period of time, resulting in the establishment of long-term embedded beliefs. It is only possible if the concerned organisations in a tight network continue to be flexible and share and change their paradigms to pragmatism.

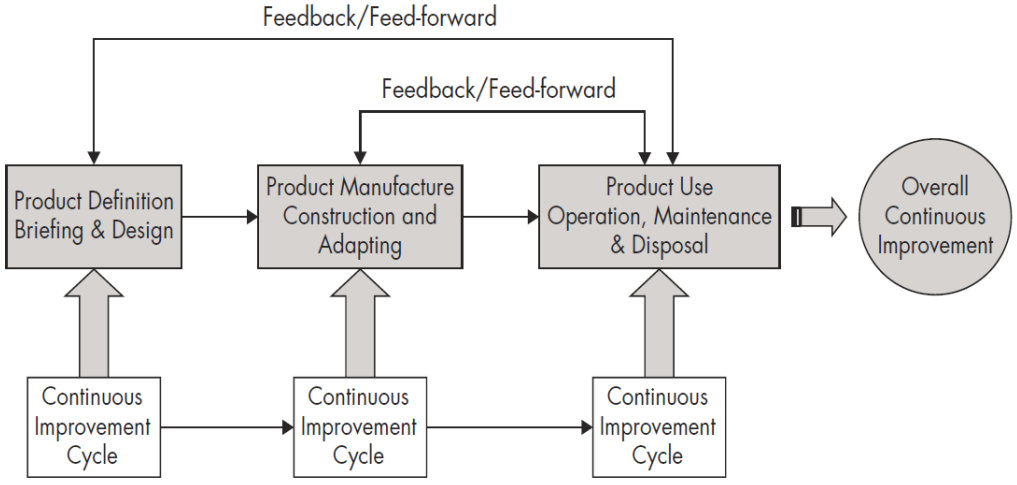
7.4.6 Learning culture

Love et al. (2002) suggest that if an alliance is to enhance its potential for learning, there is a need for TQM to be ingrained within the culture of the organisations involved in the alliance. An important factor of learning is the encouragement of dialogue between partners. Mistakes and problems must be seen as opportunities to learn and there needs to be honesty and trust within the alliance for learning to take place (Crossan and Inkpen, 1995). All partners of the alliance must be able to receive and share information, even across the boundaries of the construction supply chain and external environment. ICT systems play a significant role in improving inter-organisational relations. Distributed management information can be used for constant communication between the partners to facilitate learning (Baddeley and Chang, 2015; World Economic Forum and The Boston Consulting Group, 2016).

Much of the construction-related studies into organisational learning centre on partnering or alliances (Barlow and Jashapara, 1998; Cheng et al., 2004; Holt et al., 2000; Kululanga et al., 2001; Love et al., 2002). Chan et al. (2005) question whether organisational learning should take place at the project level, where partnering should be a prerequisite. Hence, does this imply that companies that do not partner do not engage in organisational learning? The authors recommend the need to emphasise the inter-organisational dynamics involved in both the process and outcomes of organisational learning, the consideration of organisational learning beyond partnering and the shift towards viewing projects as learning networks. Ruuska and Brady (2011) cite Davies and Brady (2000), who point out that project-to-project and project-to-business learning enable firms to reap "economies of repetition", namely reductions in cost and improvements in project effectiveness gained from the repeated execution of similar types of projects. On a spectrum of projects ranging from unique to repetitive (Lundin and Söderholm, 1995; Davies and Hobday, 2005), the PCB model (discussed in section 4.8.2) could be applied to a category of projects that evolved from a first project of its kind (starting out with unique characteristics) for a single customer to a full line of repetitive increasingly standardised projects in a policy programme or a growing market.

7.5 Existing models for strategic procurement of social infrastructure

In considering the development of a generic conceptual learning framework, it is important to review other frameworks in the context of strategic PPP procurement systems and social infrastructure and their effectiveness. Ibrahim et al. (2010) propose a generic continuous improvement framework for LIFT, as shown in Figure 7-9. It is based on the three-stage process view of improvement by Atkin et al. (2008) and Barlow and Jashapara (1998). Their argument is that long-term relationships provide considerable opportunity for learning from project to project, thereby facilitating continuous improvement of products and services while in long-term relationships.



Source: Ibrahim et al. (2010)

Figure 7-9: A conceptual model of continuous improvement in long-term relationships

Although no empirical validation of this framework has been carried out, it presents a theoretical starting point that would ensure that the constructed LIFT facilities are not only fit for purpose but are also futureproof. This research was driven by a number of rationales in the context of LIFT when the then Labour government had just launched this new policy:

- The NAO (2005) revealed that the attainment of the contractual requirements for both the demand and supply sides to continuously improve performance under the LIFT scheme remained unsystematic and may thus be unsustainable;
- Although the LIFT initiative advocated cross-project and scheme-wide learning, NAO (2005) revealed that there was little evidence of knowledge sharing between the PCTs they evaluated and that subsequent projects were already being embarked upon;
- There was a need for greater interest in evaluating how LIFT schemes were set up and the arrangements for ongoing VfM and accountability assessments as well demonstration of continuous improvement.

The research study aimed to explore the continuous improvement concept; identify requirements for implementation in LIFT procurement; develop a generic framework for achieving continuous improvement in LIFT; and identify key application challenges within the context of LIFT. The motivation by Ibrahim et al. (2010) for developing a continuous improvement framework was hinged on the overwhelming evidence from previous research. This promotes the idea that the systematic harvesting of project experiences can enable organisations to develop project competences that lead to sustainable competitive advantage through the documentation of its most effective problem-solving mechanisms in a way that facilitates continuous improvement from project to project (Chinowsky et al., 2007; Barlow and Jashapara, 1998; Schindler and Eppler, 2003). In addition, the systematic documentation of best practice, mistakes, mishaps and pitfalls should also help organisations reduce risks associated with future similar projects (Tan et al., 2007). Ibrahim et al. (2010) also point out that previous research focused primarily on harvesting explicit knowledge that is relatively easy to document (such as costs, timelines or other quantitative data) and mostly comprise numerical data that answers ‘what’, ‘where’ and ‘how many’ questions. Numerical data often does not provide answers to other key pressing project questions and problems such as the reasons for failure or how particularly efficient solutions have been built or how certain special issues have been addressed. Hence it is important to consider tacit aspects to address questions such as ‘know-how’ (procedural or heuristic knowledge) and especially ‘know-why’ (such as experiences and insights into cause–effect relationships). In BSF, the longitudinal research on the operational performance of LEPs by PwC (2010) addressed this with a more balanced focus, comprising a mixture of explicit (numerical or quantitative) data and the more tacit (qualitative) data.

To drive improvement, the model (Figure 7-9) takes into account the double-loop learning as was discussed in section 4.3 and the need to feed back/forward, which is part of systems thinking (section 4.6). It also addresses the circular nature of learning events (by using the continuous improvement cycle) and the whole-life nature of a product. However, it does not

articulate the learning from project to project within the portfolio for the duration of the partnership. Furthermore, an explanation is lacking regarding any inter-organisational learning to be encouraged between multiple partnerships. In the case of LIFT companies, the partnership is a joint venture that is often presented by major contractors, global investors in infrastructure and top-tier advisory firms (legal, technical and insurance). In these environments, the parties involved often hold shares or interest in multiple partnerships. Again, this aspect is not apparent in the conceptual model by Ibrahim et al. (2010) in Figure 7-9. Although the proposed framework was designed for LIFT, the authors state that *"it is generic in nature and can be applied in a variety of contexts"* and based on *"an underlying assumption that the achievement of gradual, consistent and ongoing continuous improvement requires focus on the organisation, the processes involved in the organisation, the employees working in the organisation, the external influences and the dynamic and complex interactions between the different actors within [the] sector"* (Ibrahim et al., 2010, pp. 206-207).

The authors recognise the need for a full-blown model which will need to include vertical, horizontal and longitudinal processes. The vertical processes include both the top-down strategy-driven process of goal-setting and deployment around commonly agreed improvement initiatives and the bottom-up process of reporting the results to sustain the initiatives through effective feedback mechanisms. The horizontal processes involve dissemination and exchange of results and experience obtained from integrated cross-functional teams. The longitudinal processes involve alignment of the requirements, values and the working processes of the various stakeholders as well as feedback and feed-forward mechanisms of lessons learned throughout the whole lifecycle of projects. Ibrahim et al. (2010) made some observations and recommendations to be considered for future research:

- There are significant differences in the maturity levels of LIFT companies evaluated in terms of appropriate systems, processes and structures in the planning and implementation of the schemes;
- The pattern of progress made confirmed an evolving system, with some evidence of project-to-project performance improvement such as reduced tendering and legal costs, increased speed of completion and better-quality facilities;
- Continuous improvement implementation and applications remain diverse and subject to varied understandings and interpretations from both the demand and supply sides. A common framework and explicit set of tools and techniques are needed for any meaningful progress in embedding it in the culture and practices of any industry.

The mixed maturity levels, the evolving nature of the system, issues as a consequence of varied understanding and interpretation, and the need for a common framework are all relevant points by Ibrahim et al. (2010) and are discussed further in the analyses in chapters 8 and 9.

7.6 A learning framework for strategic partnering in construction

Kululanga et al. (2001) highlight two underlying principles of organisational learning: the generation and/or imbibing of knowledge that results from going through a learning process induced in both internal and external business environments; and the application of knowledge to sustain continuous improvement in performance. These two principles suggest that

organisations should consider how to develop learning capabilities, and ways to measure organisational learning. In addressing this, Kululanga et al. (2001) propose mechanisms for describing how to support and measure generative learning. However, there are very few papers that describe the relationship that exists between strategic partnering and organisational learning. Cheng et al. (2004) argue that organisational learning promotes continuous improvement, which was elaborated by Irani and Sharp (1997). Continuous improvement is considered a key attribute of strategic partnering (Cheng and Li, 2002; Construction Industry Board, 1997). There is also a common premise that a learning environment (e.g. learning alliance or learning organisation) is central to the strategic form of network relationship, for example strategic alliance or construction alliance (Holt et al., 2000; Morrison and Mezentseff, 1997).

Love et al. (2000a) note that several questions still remain unanswered regarding whether the organisation itself is able to learn or whether it does so through its individuals. There are also unanswered questions regarding who is responsible for learning, i.e. the leaders, senior managers, middle management or everyone involved with the organisation? Chan et al. (2005) acknowledge the rising interest in organisational learning; however, they note a growing dissatisfaction with the lack of clarity of the concept of organisational learning and its often confusing association with that of a learning organisation (Huysman, 2000; Lähteenmäki et al., 2001; Lipshitz et al., 2002).

Swart and Harcup (2013, p. 338) warn of the personification by stating *"it is important we do not anthropomorphise organisational learning by merely applying individual learning constructs to the organisational level"*. Swart and Harcup (2013) suggest that an understanding of the various levels of learning, how it is transferred and interconnected, is required. This particularly pertains to projects in which often multiple interdependent organisations are involved with conflicting goals and objectives. And of which each have varying roles and responsibilities that are dependent on the transfer of information and knowledge to conduct daily operations. Learning in this instance is seldom transferred and embedded into a project's architecture and structure, as team members, on completion of their tasks, return to their line functions (or move to another project), taking their experiences with them. Consequently, such experiences have a tendency to be only accessible through informal networks (Schindler and Eppler, 2003). Finally, Love et al. (2015a) also point out the distinction between individual learning and collective learning. They conclude that it is only through engaging in the process of reflection, facilitated by a coaching approach, which makes it possible for tacit knowledge to be externalised as shared artefacts. The process of coaching enables the translation from individual into collective learning to occur within an alliance.

If organisations involved in strategic partnerships in construction are to become adaptive and responsive to the environment, then they have to re-think their approaches so that collective learning is incentivised. Love et al. (2000a) argue that simply repeating strategies that have

failed is not a useful exercise, but it is something the construction industry often tends to do. Thus, it might be concluded that construction organisations need to embrace double-loop learning so as to challenge the underlying concepts, paradigms and visions that have determined their way of thinking in the past, in examining models of action. Love et al. (2000a) conclude that if principles of TQM need to be implemented, organisations may well have to unlearn, that is, change their existing mind-set and paradigms so that TQM practices become a part of organisational life.

Schwab and Miner (2011) point out that from a broader perspective, theory of organisational learning by temporary organisational forms such as project ventures (or companies) deserves more conceptual and empirical research attention. The notion of a temporary PBO was previously introduced and debated in section 3.4. A theoretical framework might assist, but as Knauseder et al. (2007) point out, adopting another learning approach for different types of PBO companies seems to be a more relevant strategy than implementing a 'one size fits all' learning approach for all construction project organisations.

Previous research has shown that performance in integrated projects depends on how quickly and successfully PPP firms can learn and find repeatable solutions (Davies and Brady, 2000). Consideration of the full range of uses of SPVs as TOs beyond their function as purely financial instruments is necessary to mitigate and share risks with limited exceptions (Smyth and Edkins, 2007). These include organisational structures, governance mechanisms and the multiple temporary contexts in which complex behaviours occur (Brookes et al., 2017; Lundin et al., 2015). Firms involved in integrated solutions (e.g. PPP) have to be able to learn, change and renew their structures continually while at the same time delivering the solutions their customers demand (Brady et al., 2005b). The demand for integrated contracts has meant that the traditional project lifecycle now extends over many years or even decades. Davies et al. (2011) identify four main stages in the lifecycle model of these projects: (1) engaging with the customer in high-level strategic negotiations, often before an invitation to tender has been issued; (2) working closely with the customer to develop a value proposition during a bid, offer and delivery phase; (3) project managing the systems integration process; and (4) operating the product or system during a specified contractual period. In these circumstances, suppliers and customers can establish long-term strategic partnerships and create co-located organisations to foster the kind of close cooperation and innovative environment required to ensure that a customer's problems are solved (Davies et al., 2011).

Reflecting on the various theoretical frameworks presented in this chapter, the following limitations are observed and discussed in the context of LEPs as a strategic PPP procurement system:

- While the need for continuous improvement in these PPPs is clear (see sections 3.2 and 7.3), existing conceptual frameworks do not emphasise clearly enough the need for continuous learning over time in the context of a portfolio of projects that go through a

lifecycle (section 7.5). The LEP model (and LIFT and hub models) was designed as a hybrid form of PPP with characteristics of both a permanent and temporary organisation, aimed to develop, deliver and operate a series of projects to a contracted set of whole-life performance targets. In such an arrangement, it is important that lessons can be learned and continue to be learned as the key participants involved move from the first project to the next, to the following, and so forth.

- The existing conceptual frameworks discussed in this chapter do not fully consider what a coherent TQM philosophy of Commitment, Communication and Culture (3 Cs) and Planning, Process, Performance and People (4 Ps) can bring to a strategic partnership at each facet of the asset life. While the elements of TQM as discussed in section 7.2 are utilised when LEPs are in business, there appears to be a lack of cognisance to these principles.
- Existing learning frameworks lack the connection with systems thinking in the context of a portfolio of projects that foster a culture where the participants in the partnership can make sense of a collective learning environment by seeing the whole instead of the sum of its parts. The legacy BSF policy included contract mechanisms to encourage collective learning such as business plans, collective partnership targets, KPIs, and continuous improvement targets. However, participants that make LEPs were not at all incentivised to learn collectively. The mechanisms were often seen as counterproductive and only produced because it was contractually required.
- Existing models do consider feedback loops but fail to address the need for programme evolution with high-end feedback systems in place and incentives that encourage participants involved to pass learning on. The BSF programme was cancelled and in doing so the LEP model had to prove itself to deliver a smaller pipeline by being agile, flexible and adaptable to new circumstances.
- The long-term temporal nature of strategic PPPs (LEPs) means that these should be regarded as temporary PBOs with the underlying assets as project-based environments (section 4.8). Both have characteristics of ongoing ‘businesses’ that have to be optimised on multiple strands (e.g. financial, political, technical, public relations, marketing, commercial, contractual, human resources, ICT, operational) instead of ‘projects’ that need to be finished on time, and to budget and a set of quality parameters. Private sector organisations involved in LEPs (and LIFT and hub models) associate the notion of ‘value enhancement’ predominantly with their annual financial performance instead of aspects pertaining to the functional performance requirements.

Because of these listed shortcomings, it is suggested that a new learning framework is needed. It is called the Asset Value Enhancement Model (AVEM) and is diagrammatically presented in Figure 7-10. The AVEM has evolved and adapted from the multiple theoretical frameworks discussed in this chapter and chapter 4:

- Double-loop learning (Argyris, 1977), as discussed in section 4.3 on p. 101;

- PDCA cycle (Deming, 1986), in section 7.3.2 on p. 178;
- Five learning disciplines (Senge, 1990; Senge, 2006), as discussed in section 4.5 on p. 103 and section 7.4.1 on p. 182;
- Learning framework for successful cooperative strategic partnerships (Morrison and Mezentseff, 1997), section 7.4 on p. 181;
- Learning model for construction alliances (Love et al., 2002), Figure 7-8 on p. 181;
- Continuous improvement model (Cheng et al., 2004), Figure 7-7 on p. 179; and
- Revised TQM framework (Oakland, 2014; Oakland and Marosszeky, 2006), Figure 7.2.

These theoretical concepts in isolation do not address the gap in theory for this complex hybrid form of PPP as identified and explored in section 4.10. The AVEM combines the model for construction alliances (Love et al., 2002) as shown in Figure 7-8 with the continuous improvement model (Cheng et al., 2004) in Figure 7-7, but uses the revised TQM framework (Oakland, 2014) in Figure 7-2 instead of the original TQM framework. However, embedded within are other existing theoretical frameworks by Argyris, Deming, Senge, and Morrison and Mezentseff.

Implementing the AVEM (Figure 7-10) as a learning framework allows us to follow these four stages in the order of Deming's PDCA cycle on a repeating basis, whereby each stage can be apportioned to a pillar of the revised TQM framework (as shown in Figure 7-2 and Figure 7-6). The framework encourages that most critical learning is passed on when teams/individuals move to a next stage, or progress, leave, merge or acquire an organisation. This addresses a concern raised by Defillippi and Arthur (1998), who argue that knowledge that is accumulated in the course of a project is at risk of being dispersed as soon as the project team is dissolved and members are assigned to a different task, another team or a new deadline. This happens by identifying specific opportunities for the temporary project organisation to learn, from project to project, any collective learning points by the various participants that make the consortium, and any considerations for learning over time as projects travel through their asset life. The circular model calls for a joint Commitment, shared Culture and aligned Communication (three Cs) to cultivate ongoing value to the public and steady returns to the private sector, beyond merely project-specific improvement.

The AVEM shown in Figure 7-10 is split into an upper part (green) and a lower part (blue), in the same way as the learning model for construction alliances by Love et al. (2002) in Figure 7-8. The essential components of the upper part of the model are derived from Senge's five learning disciplines: systems thinking; learning culture; knowledge and communication; changing mental modes; joint learning structures/processes; and development of learning relationships. In large enterprises with multiple strategic partnerships, the participants that make up the consortium in long-term partnership A and in long-term partnership B can share a collective learning environment, where past learning is captured and passed on. It is the imposition of a learning culture that encourages inter-organisational learning to take place.

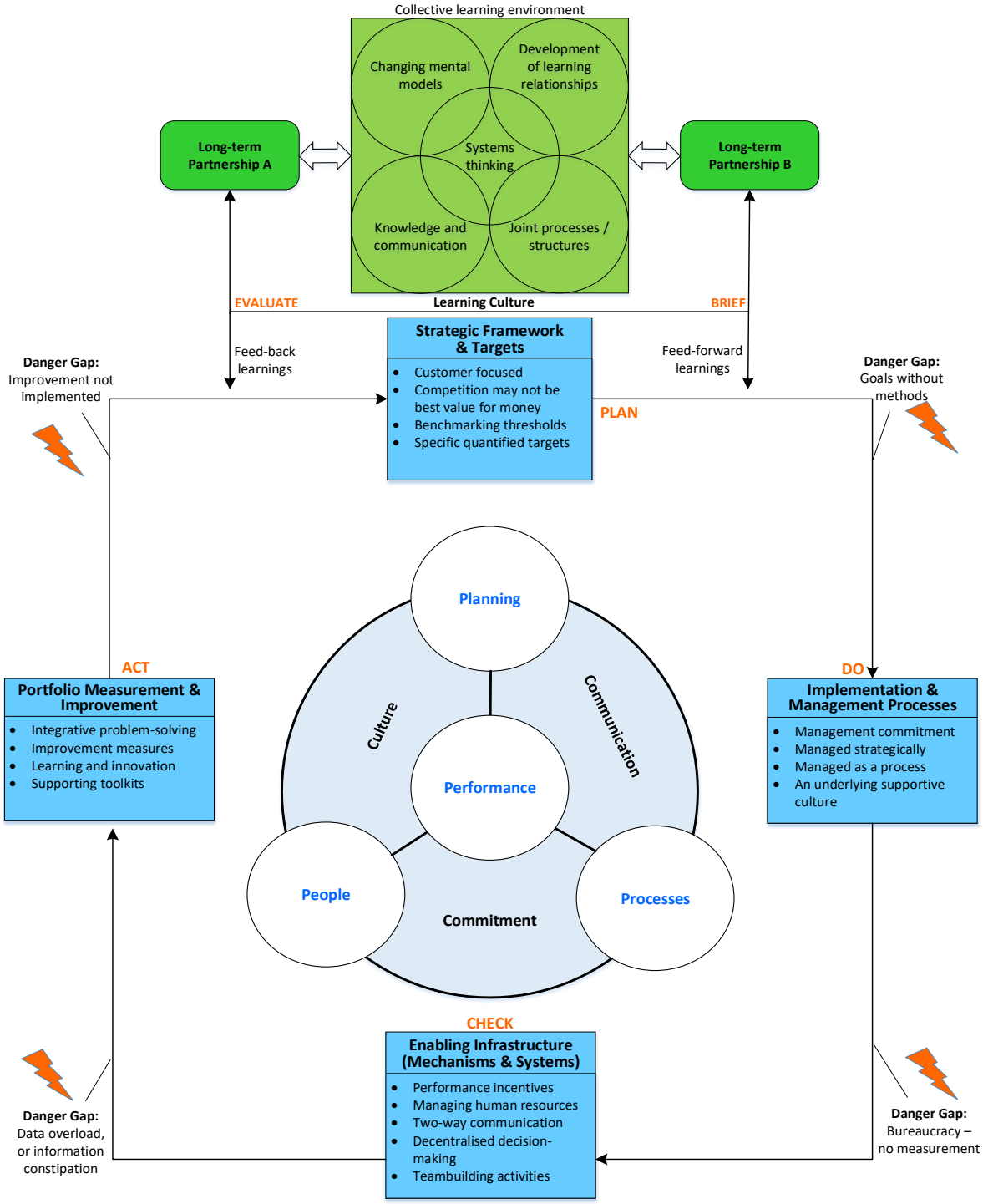


Figure 7-10: Asset Value Enhancement Model for strategic partnership procurement

The upper model (green) intersects with the lower model (blue) to encourage forms of systems thinking by the participants involved at each of the PDCA quadrants. The PDCA improvement cycle with framework of reference for strategic partnerships and the revised TQM framework enable an environment whereby partners attempt to become more process-focused (effects of planning, processes, performance and people related to commitment, communication and culture towards a portfolio of projects between customer and supplier). These theoretical

principles were discussed in sections 4.6, 7.3.2 and 7.4.1. They help to address the gap in theory for this complex hybrid form of PPP, as was explored in section 4.10.

The AVEM displays a single-loop learning effect, at a portfolio or programme level in the lower part of the model as individual projects travel through their asset life (as shown in the blue boxes). At each stage of the PDCA cycle, there are many specific single-loop learning points at a tactical/symptomatic level that can be captured and passed on ('the learning points'). The double-loop learning effect ('learning how to learn') takes place between the lower part and the upper part as shown in the green boxes. It is concentrated on understanding how relevant factors collectively interact to give rise to a problem. Within a TQM environment, systems thinking can be used to find these root causes to problems at each stage in the PDCA cycle around commitment, communication and culture. This is possible by asking participants involved probing questions around these factors (e.g. what worked well, what failed, or what would parties do differently, supported by 'how' and 'why' questions to find credible solutions.

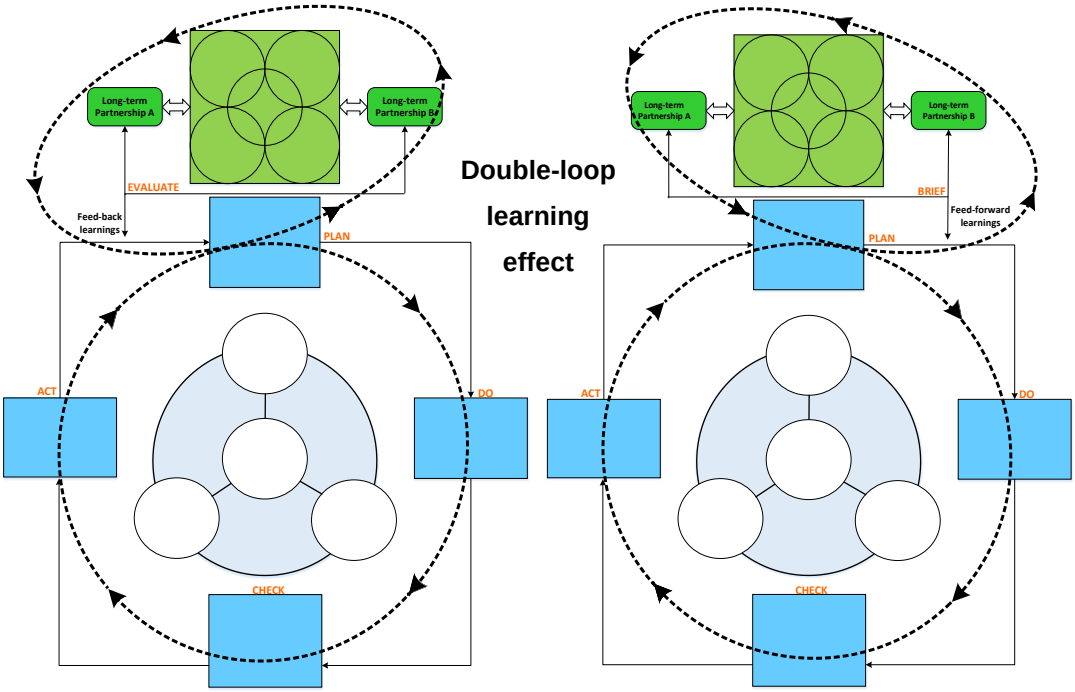


Figure 7-11: AVEM as an evaluation versus briefing framework

This research study takes a perspective on learning by exploring, monitoring, analysing and evaluating new phenomena. Existing UK PPP procurement policies can be analysed and any collective learning points from the past can be fed back for future projects in the portfolio, to the organisations involved or to support future policy evolution. This research follows the schematic on the left in Figure 7-11, which shows the AVEM as a framework with an evaluation loop/approach. This reflective approach calls upon an ex-post approach to data collection (i.e. based on actual results rather than forecasts). A second perspective is that of a briefing framework, as shown on the schematic on the right in Figure 7-11. In that case, AVEM would feed its specific learning points from creative workshops, brainstorm sessions and gateway

reviews at each of the quadrants in the PDCA cycle. This alternative approach is rather forward-looking and calls upon an ex-ante approach to data collection.

The reflective nature of this PhD research, which explores the effectiveness of an innovative PPP procurement policy, means that all data obtained is historic, that no projections are made and as such the AVEM is proposed as an evaluation framework. However, for future research it may be worthwhile exploring and testing the AVEM as a briefing framework for strategic partnership procurement systems in construction.

7.7 Applying the AVEM to UK strategic PPP procurement policies

A number of strategic PPP procurement policies in the UK were introduced in section 2.4. The AVEM, as shown in Figure 7-10 and discussed in the above section, needs to be contextualised to real-life strategic PPP procurement systems for social infrastructure. The model may be useful for academia and policymakers to explain and debate at what point(s) the learning achieved in operational strategic PPP procurement policies (for example LEP, LIFT or hub companies) creates an opportunity for incremental or radical changes (section 4.8), and under what circumstances any observed lack of learning becomes disruptive. It helps key participants in strategic partnerships to identify evidence of past learning: specific opportunities to learn from those organisations involved going from project to project (i.e. project-based learning as debated in section 4.8), joint learning points of the collective participants involved in these partnerships (section 4.8 looked at inter-organisational learning in the supply chain), and any considerations from those participants that continue to learn over time (systemic collective learning in section 4.4). What is being achieved, how and why, and what is being learned as a consequence of that accomplishment (or failure to do so) is related to research objective 2 that was previously posed in chapter 1 (section 1.3):

Research objective 2 – Organisation level:
To explore how key contract mechanisms are being judged by the participants in strategic partnership procurement systems, and to evaluate what their collective learning observations are, to be able to meet clients' expectations related to the achievement of whole-life VfM and environmental sustainability criteria agreed on projects.

The AVEM can be applied as an evaluation framework both at asset level (i.e. project) as well as at organisation level (i.e. LEP) to demonstrate evidence of past learning. While it is interesting to draw collective learning observations from the AVEM when implemented in the context of LEPs, the same could occur for LIFT and hub companies, or any PFI/PF2 project company comprising a bundle of projects. Taking the legacy of BSF, the LEP is the organisation, and the school project is the social infrastructure asset. The circular and collective learning is embedded in the AVEM framework as presented again in Figure 7-12, with a cloud below each quadrant. These clouds can be interpreted in the same way as the

continuous improvement model for strategic partnering in construction by Cheng et al. (2004) in section 7.3.2 on p. 178.

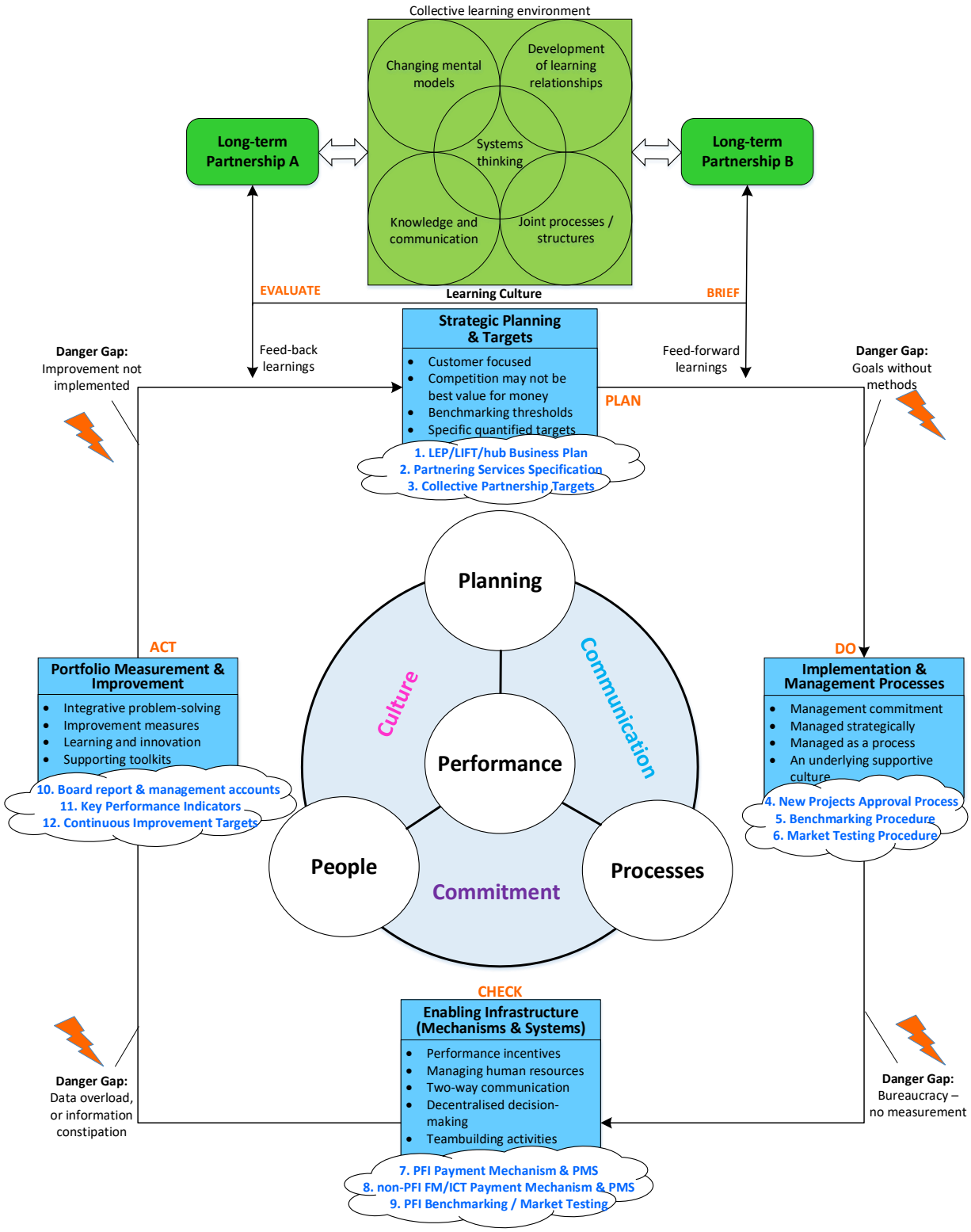


Figure 7-12: AVEM applied to UK PPP portfolio procurement policies (LIFT/LEP/hub)

The UK policy documents typically adopted in strategic partnership procurement systems for social infrastructure (e.g. LEP, LIFT or hub companies) are apportioned to each of the four PDCA stages. These particular policies have evolved since the early 2000s to the present

time. First with the policy for LIFT, then in parallel with BSF LEPs, and finally also with Scottish hubs. Each of these UK policies were introduced in section 2.3.3, and the mechanisms that underpin the typical standard policies in each PDCA quadrant are explained in **Appendix G1**.

1. The Plan stage, called *Strategic Planning & Targets*, defines the company board direction of travel along with its long-term public sector partner. This is the origination stage where new projects in the authority's strategic plan are initiated, deal teams are structured and mobilised to prepare proposals and financing solutions, and where feedback can be gathered from earlier projects in the company's portfolio. The latter is important to encourage lessons learned by reflection to stimulate continuous improvement from the last stage on previous projects (portfolio measurement and improvement). To support this stage in operational LEP, LIFT and hub companies, UK government departments developed standard policy documents such as a company business plan, partnering services specification, and collective partnership targets. Reasons for adopting these policies are stated in the AVEM learning framework: to set a vision, goals, resource and governance for maintaining customer focus, to strategise ways to deliver best VfM (and environmentally sustainable) assets, and to set thresholds for benchmarking or other specific quantified targets in the absence of competitive forces.
2. The Do stage, called *Implementation & Management Processes,* puts into action what was defined in the previous stage, along with collective learning points gathered from previous cycles. In order to deliver on time, to set budgets and quality standards, there are implementation and management processes embodied in the standard policy documents. To support this stage, UK government departments introduced policies: a new projects approval procedure, cost benchmarking and market testing procedure for new projects. Multi-disciplinary development and delivery teams are mobilised, comprising planners, designers, building contractors, lenders and investors, structural and M&E services engineers, QS firms, FM providers and specialist consultants. Often led by an authority client team and a strong private consortium leadership team with support from design and construction managers, the strategic business case from the previous Plan stage is worked up into an OBC and FBC. This comprises a detailed design, programme, output specification, capital and operational cost model, financial model, and other deliverables (such as planning permits, risk assessments, method statements, and Health and Safety plans).
3. The Check stage, called *Enabling Infrastructure (Mechanisms & Systems)*, commences post completion and handover of the assets built in the previous stage. Once occupied, a different regime starts for the strategic partnership, that of long-term operational asset management. To support this stage in PPP portfolio procurement policies (e.g. LIFT/LEP/hubCos), UK central government departments developed standard documentation such as a payment mechanism and performance monitoring system for PFI/PF2 contracts, FM or ICT contracts, benchmarking and market testing for operational PFI/PF2 contracts. Supervised by the public client and directed by the company board, a supply chain of building contractors, FM and ICT providers, and specialist operators are appointed with long-term contracts for up to 35 years. Management relies on the contractual infrastructure to check if the supply chain is meeting the performance and quality standards. Due to the long-term nature, participants are incentivised to continue to learn collectively over time, both as individual organisations and as teams collaborating and reflecting periodically in a systematic way.
4. In the Act stage, called *Portfolio Measurement & Improvement*, senior leaders compare, relate and act on the performance appraisals of individual assets. To support this stage in PPP portfolio procurement policies for social infrastructure, UK central government departments developed standard toolkits to inform decision-making, such as a template company board report and management accounts, KPIs and continuous improvement targets. Management information is collated from all previous stages and all assets in the portfolio are populated to highlight problem areas (marked Red-Amber-Green) and inform director decision-making and senior manager action. The need for collective learning at this stage is evident, supported by the notion made at the start of this section that it creates an opportunity for decision makers to make changes (incremental or radical), and to avoid increased risk of disruption.

The majority of the policy documents for LEP, LIFT and hub companies are templates encapsulated in standard form contract documents that are accessible online.[36] The reason for having each of the PDCA stages populated with standard procurement policy mechanisms is because it then enables each of them to be analysed not just in isolation, but as part of a wider composite. Firstly, each of the PDCA stages can be linked to each of the four pillars of TQM (the four Ps), and questions can be asked about what key participants in the strategic partnership have learned about commitment, communication and culture in relation to the policy documents, both as a collective LEP, LIFT or hub company and as individual participants within. Secondly, it allows senior directors and management to think about how to learn as a collective body from project to project and inter-organisationally between the multiple partnerships that these organisations (often major contractors and large investors) might own, so that best practice knowledge is retained for the future, shared systematically between the concerned organisations and to prevent similar mistakes occurring again.

This research calls for an evaluation of the effectiveness of these major procurement policies that underpin strategic PPP procurement systems based on the outputs they have produced and the observations from participants that have worked with these policies at a detailed level.

7.8 Summary of chapter 7

The aim of this chapter was to translate the study's central research question – ***How can collective learning take place effectively for organisations collaborating in possible future strategic PPP procurement systems from the case of LEPs?*** – into a conceptual learning framework. This chapter commenced with an outline of how organisational learning can be embedded in the construction industry, especially when large corporates are involved in a form of strategic partnership procurement. The literature review exposed a number of accepted critical features (e.g. principles of TQM, PDCA, and continuous improvement), and a number of critical features that are not yet embraced in the construction industry (e.g. double-loop learning, collective learning and systems thinking), and importantly it also exposed a number of aspects that scholars have not sufficiently explained and also leaves a potential gap for policy making. This pertains to the notion that strategic partnerships can only operate if there is a portfolio of projects (as opposed to a single project). In manufacturing and assembly, the production lines of goods are typically optimised and calibrated at regular intervals to maximise customer value and efficiency of delivery. With social infrastructure, the idiosyncratic nature of buildings comes with its limitations; however, in strategic procurement systems comprising portfolios of projects, it is reasonable that contract mechanisms are imposed to make sure that collective learning takes place, at multiple levels and at regular intervals so that senior management can act as necessary, effectively and efficiently.

[36] Website Community Health Partnerships: www.communityhealthpartnerships.co.uk/lift-documents
Website Scottish Futures Trust: https://www.scottishfuturestrust.org.uk/page/hub

Having noted the significance of complexity and scale inherent to strategic partnerships for social infrastructure, the AVEM is proposed as a conceptual framework for collective learning. It can be used at project or portfolio evaluation and briefing. It is a composite of seven existing theoretical frameworks developed by scholars in the academic domain of management sciences, especially organisational learning. By covering essential dimensions of learning integrally, the AVEM provides a base for a more cognisant, inclusive and adequate understanding of the collective learning as it occurs in and by organisations. It addresses the gap in theory that was identified in section 4.10. While it is recognised that the AVEM is not all-encompassing and cannot fit all circumstances, it is hoped that the model stimulates a systematic way, using systems thinking, to manage strategic PPPs. It is hoped that the use of the model can be a step forward in thinking about how to manage complexity, without losing control due to vague or unrealistic goals, bureaucracy in management processes, data overload or flaws, and indecisive leadership failing to implement improvements. If participants that make up strategic partnering organisations are to become learning organisations, TQM will be the key method to achieve this. Ideas of collective learning over time allied to concepts such as empowerment and partnership, which are aspects of TQM, also imply that change is required from the status quo to the parties' commitment, the way they communicate and the culture when working together in partnership.

The conceptual learning framework, the development of which was described and explained in this chapter, has been contextualised to real-life strategic PPP procurement systems for social infrastructure in the UK: LEP, LIFT and hub companies. In order to empirically demonstrate the model, it was validated and utilised for data collection and analysis by taking the case of operational BSF LEPs (see chapter 9). In this context, the AVEM can be implemented by presenting how a selection of LEPs perform compared to the overall benchmark in the market. If, based on the data, performance of the selected LEPs exceeds the benchmark, then collective learning has been demonstrated and presented using the AVEM as an evaluation model. If the selected LEPs underperform against the benchmark, then this is an indication that learning needs to occur, again using the AVEM as a framework of reference.

The AVEM as a generic conceptual learning framework will not only facilitate the evaluation of this research study, but importantly it may also serve as a framework of reference for academia, policymakers and practitioners. It might help to explain and debate at what point(s) the collective learning points achieved in a strategic partnership structure create opportunities for changes (incremental or radical) and under what circumstances any observed lack of collective learning becomes disruptive. The AVEM will need to be supported with evidence collected with data from real-life LEPs.

Chapter 8 will turn to the findings in response to research objective 1, using data generated from schools delivered by LEPs.

Chapter 8 – Results from appraising the assets

8.1 Overview

Chapter 8 aims to understand what the client's key asset performance criteria are in projects delivered by strategic partnership procurement systems (LEPs), and to explore how these requirements are appraised empirically for these joint ventures to deliver whole-life VfM and environmentally sustainable buildings.

Section 8.2 summarises performance criteria of new and refurbished schools procured through LEPs between 2004 and 2010. A detailed programme-level appraisal assesses how 600 operational schools that were procured and delivered through 44 LEPs in England achieve against key contracted performance criteria defined in the legacy BSF policy. Section 8.3 aims to categorise and apportion the variables that measure and ultimately underpin the delivery of whole-life VfM and environmental sustainability criteria set in standard BSF policy documents. To better understand the variables and categories from various datasets received (Table 6-5), the section explains how and why the data was chosen, what their properties are and any limitations. In section 8.4, a number of relationships between the asset value criteria are considered prior to performing MCAs. Section 8.5 presents outcomes of the asset-level appraisal: examples of results following a series of MCAs of the data, using BSF standard policy and industry benchmarks between 2004 and 2010. The programme-level appraisal of school-level data was conducted in line with the methods set out in chapter 6, using the input assumptions in section 6.5.3. Section 8.6 handles the sensitivity testing to changes in target levels of performance criteria. Target levels for criteria (which could be made of a combination of different variables) are adjusted to the average values in their respective dataset, to find out how they compare against contract thresholds. Finally, the summary in section 8.7 discusses any known gaps or incompleteness in the results, or where the data may be uncertain or unreliable, as well as the conditions for LEPs with schools that have been selected for further research in chapter 9.

8.2 Performance criteria of schools procured through LEPs

Despite the fact that a suite of standard BSF contract mechanisms is typically in place (Table 6-16 on p. 145 and **Appendix G1**), recurring concerns remained about whether schools delivered by LEPs are cost-effective and deliver ongoing VfM. The reason often stated was that it was too early to tell (House of Commons, 2007; NAO, 2009; Public Accounts Committee, 2009; PwC, 2010). While the same concerns remained post cancellation of BSF about schools being too expensive to build and to run, more recent reports are also critical about other aspects: protracted procurement processes, ambiguous governance structure, overly ambitious designs, and sustainability goals not achieved (House of Commons, 2015; James, 2011; Shaoul et al., 2013). As for meeting climate change criteria, recent studies by Mumovic and Santamouris (2009, p. 5), who refer to Mumovic et al. (2009), show that none of the facility

managers, teachers and pupils in schools are conversant with state-of-the-art building management systems, providing them with an opportunity to balance energy, consumption and ventilation requirements to some extent. Furthermore, recent studies show that the cost of poor indoor environment for the employer, the building owner and for society as a whole are often considerably higher than the cost of energy used in the same building (Dasgupta et al., 2012; Wargocki, 2009). While all these concerns pertain to output criteria of learning environments, the James Review also comments on outcomes, i.e. whether pupil performance has improved in schools completed under BSF faster than in non-BSF schools (**Appendix D**, section 3.5). Recent studies show modest evidence that this might be the case; however, further appraisal in this area is needed with more accurate data (Ive et al., 2015; KPMG International with UCL, 2010). Furthermore, good indoor environmental quality can improve overall work and learning performance, while reducing absenteeism (Toftum et al., 2015; Wargocki and Wyon, 2013). This research study only appraised the effects of building-related output criteria, not outcomes, and consequently education attainment was not included in the scope of this research.

Most of the whole-life asset value criteria for LEP-built schools are defined in the standard form SPA, Schedule 14, Part 2 entitled: Track Record and Key Performance Indicators.[37] Table 8-1 summarises 40 standard KPIs and a copy of the Schedule is in **Appendix G2**. Each of the 40 standard KPIs could be adjusted and revised to be consistent with the SfC in the local area in which the individual LEP operates. The potential lack of consistent data because of different LEPs operating to different KPIs became a potential limitation to the research which was discussed in section 6.5.5. The template schedule of KPIs has been pre-populated by PfS with target levels, 25 of which are National Priority KPIs whose levels are in line with the Constructing Excellence National KPIs that were set at the time (Constructing Excellence, 2008).[38] These are marked with a tick sign (✓) in Table 8-1. Individual LEPs may have agreed with their LAs to adopt a set of different KPIs for their projects, or the levels may be set lower or higher than the standard form in **Appendix G2**. KPIs are divided into six main categories: partnering services, quality, timeliness, cost, customer satisfaction, and others. The template for LEPs follows a similar structure to the National Priority KPIs and those seen in LIFT and hub companies. The decision for a selection of KPIs from the SPA Schedule 14 to be eligible to represent a set of whole-life asset value criteria to be analysed for this research was dependent on:

- The ability of a KPI to either fit in the category of VfM or environmental sustainability. The definition of and background to these categories was previously discussed in chapters 2 and 3 and also in **Appendix A**; and
- The ability of a KPI to be apportioned to one of the procurement stages: design, build, maintain or operate, and;

[37] http://webarchive.nationalarchives.gov.uk/20120202141958/http:/www.partnershipsforschools.org.uk/library/BSF-archive/BSF-standard-documents.html (visited: Mar-2014)
[38] An overview of all UK annual KPI reports between 2007 and 2016 is on the Constructing Excellence website: http://constructingexcellence.org.uk/kpi-reports/ (visited: Jan-2017)

- The ability of a KPI to either fit the category of capital expenditure or type of provision, in order to allow in the analyses of the data to control for one or both categories; and
- The availability of and access to data in the public, semi-public or private domain; and
- The representative data available of a KPI to cover between 50% and 100% of the total sample size of 600 schools (the total population of LEP-built schools is 700), after correcting for errors (as explained in section 6.5.1).

Based on these decision factors, any KPIs highlighted yellow in Table 8-1 were selected from Schedule 14 for this research to be representative of whole-life asset value criteria.

Area of assessment	Objective	Key Performance Indicator
1. Partnering services	To produce high-quality proposals that meet the requirements of the LA and other stakeholders.	1.1 Quality of New Project Stage 1 proposals
		1.2 Quality of New Project Stage 2 proposals
		1.3 Satisfaction with partnering services ✓
2. Quality	To achieve a high quality of design in all schools.	2.1 Client satisfaction of Design Quality ✓
		2.2 Test of conditions, suitability and sufficiency of schools ✓
		2.3 School accessibility ✓
	To achieve high quality of construction in all schools.	2.5 Construction quality ✓
	To achieve high-quality FM services across all schools.	2.6 Operational service quality ✓
	To ensure that all schools have high-quality, reliable ICT facilities that are integrated with the building infrastructure.	2.7 ICT infrastructure quality ✓
	To create and maintain sustainable school buildings, and to minimise construction waste.	2.8 Environmental performance ✓
	To minimise disruption of existing education services in schools.	2.9 Disruption of school operations ✓
3. Timeliness	To increase the efficiency of procuring new schools infrastructure, in terms of procurement timescales and predictability of outcome.	3.1 Development (LA request for New Project Proposal to Approval of Stage 1 Proposal)
		3.2 Design and procurement (Approval of stage 1 to financial close or contract award)
		3.3 Detailed design & build (from financial close / contract award to operational commencement)
		3.4 Total project (from request of a New Project Proposal to commencement of school operation)
		3.5 Predictability (design & build of school) ✓
		3.6 Predictability of total project ✓
		3.7 SPA Stage 1 New Project Approvals all contractual derogations to be provided to PfS within 4 weeks of the LA Stage 1 approval ✓
4. Cost	To control whole-life costs of schools across the programme, and to produce long-term cost efficiency.	4.1 Average total cost of construction ✓
		4.2 Predictability of initial scheme design fees at Stage 1
		4.3 Predictability of initial scheme design fees from Stage1 to Stage 2
		4.4 Lifecycle costs
		4.5 Facilities management costs
	To improve the predictability of cost of new school facilities, and to deliver within budget.	4.6 Predictability of external works costs ✓
		4.7 Predictability of abnormal costs ✓
		4.8 Predictability of whole-life costs ✓
5. Customer Satisfaction	To maintain satisfied customers at all times.	5.1 Design and procurement phase ✓
		5.2 Construction phase ✓
		5.3 Operational phase ✓
6. Others	To maintain a high safety record in construction.	6.1 Safety ✓
	To create extended schools and to improve and encourage use of facilities by the community.	6.2 Community use of schools ✓
	To increase the popularity of local schools.	6.3 Popularity of local schools ✓

Table 8-1: Standard KPIs in the SPA, Schedule 14 Part 2

Each of the standard KPIs has a specific level set to pass a 'Track Record Test'. These can be seen on the template in the **Appendix G2**. To be able to perform a programme-level appraisal (p. 69) of asset-level data against the targets that were imposed at the time of BSF,

closer examination was needed of Target Levels for the individual KPIs marked yellow in Table 8-1. Given the need for a programme-level appraisal, as opposed to testing a single LEP portfolio, in some cases there was a need for a more crude or alternative target to measure the same KPI. This was primarily because data to strictly measure against the Standard KPI Target was not always available for the 600 LEP-built schools. It was possible, however, to turn the Standard KPI Targets in SPA Schedule 14 into a set of rationalised KPI Targets so that higher volumes of representative data could be utilised for MCAs and to be able to interpret findings. Table 8-2 repeats the selection of standard KPIs extracted from SPA Schedule 14, with an alternative KPI Target Level to be able to perform further analysis.

Key Performance Indicator	**How measured**	**Standard KPI Target Level 1 / 2**	**Rationalised KPI Target Level for PhD**
1.3 Satisfaction with partnering services✓	Percentage of surveys passed in accordance with PfS survey guidance (including Design Reviews).	L1 >65% new build L2 >50% refurbishment or FM services	Confirmed commitment to Design Reviews. 'Yes' or 'Unknown'.
2.1 Client satisfaction of Design Quality ✓	Average % achieved across all completed schools in post-occupancy DQI for schools. Percentage targets have been set for both the 'Fundamental' category of the DQI and across 'all criteria' of the DQI.	Fundamental: L1 95% new build L1 90% refurbishment All criteria: L1 70% new build L1 60% refurbishment	Confirmed commitment to DQIs. 'Yes' or 'Unknown'.
2.8.1 Environmental performance ✓	Environmental performance of design to be measured by % of schools meeting or exceeding Very Good score against BREEAM criteria.	L1 100% score 'Very Good' on new build L1 70% score 'Very Good' on refurbishment	BREEAM 'Very Good' or higher achieved: 'Yes' or 'Unknown'.
2.8.2 Environmental performance ✓	Energy efficiency in operation.	L1 average kWh / m^2 / school / yr within +/-10% of design estimates. L2 average kWh / m^2 / school / yr within +/-20% of design estimates	DEC rating ≤100 achieved.
3.3 Detailed design and construction time	Per scheme the number of calendar months (rounded up to the nearest month) taken between the date of FC/contract award and operational commencement.	<24 months new build <32 months refurbish	Secondary schools: ≤24 months new build ≤32 months refurbish Primary schools: ≤18 months new build ≤24 months refurbish.
4.1 Average total cost of construction✓	Mean total cost per m^2, calculated as the actual final total cost (at FC for PFI, at completion for D&B Target Cost) for new construction divided by the gross floor area.	< Average initial project cost per school type / m^2	Capital cost £/m^2 per school ≤ Cabinet Office national average benchmarks for new build, or BCIS average for refurbishments.
4.5.1 Total FM costs	Local average of FM and administration costs per annum compared to national average.	Local average within +/- 20% of national average	Cost £/m^2/yr per school ≤ BCIS national average benchmarks +/- 20%.
4.5.2 Hard FM costs	Local average of building maintenance costs per annum compared to national average.	Local average within +/- 20% of national average	Cost £/m2/yr per school ≤ BCIS national average benchmarks +/- 20%.
4.5.3 Soft FM caretaking costs	Local average of caretaking costs per annum compared to national average.	Local average within +/- 20% of national average	Cost £/m^2/yr per school ≤ BCIS national average benchmarks +/- 20%.
4.5.4 Soft FM cleaning costs	Local average of cleaning costs per annum compared to national average.	Local average within +/- 20% of national average	Cost £/m^2/yr per school ≤ BCIS national average benchmarks +/- 20%.
5.4.5 Energy costs	Local average of utilities costs per annum compared to national average.	Local average within +/- 20% of national average	Cost £/m^2/yr per school ≤ BCIS national average benchmarks +/- 20%.
5.3 Customer satisfaction – operational phase ✓	Percentage of surveys passed in accordance with PfS survey guidance (incl. POEs).	L1 >65% L2 >50%	Confirmed commitment to POEs. 'Yes' or 'Unknown'.
6.2 Community use of schools ✓	Mean number of hours that schools within a LEP are actually used for non-school activities compared with prediction in OBC or relevant Stage 1 development.	L2 80% of prediction at ITPD or Stage 1	Confirmed offer of extended/external facilities for pupils or community use. 'Extended' or 'Standard'.

Table 8-2: Selection of standard KPIs for research and rationalisation of Target Levels

For some KPIs, Target Levels have changed from a percentage to a simplified binary measure: 'Yes' or 'Unknown' (such as KPIs 1.3, 2.1, 2.8.1, 5.3 and 6.2). Other Target Levels have been expanded to include primary schools (KPI 3.3), or changed into an alternative Target Level that captures the same tenor (e.g. KPI 2.8.2). The main reasons for making these changes can be explained by studying the underlying data sources available. This will be discussed in the following section.

8.3 Apportioning specific data sources to asset value criteria

A large number of asset-level datasets have been called upon and analysed further, each of which is named in Table 6-5 and **Appendix J2**. This section aims to bring further reasoning to the selection of the data sources, firstly, to identify what specific suitable variables are within what data sources, and how some of these can be translated into an asset value criterion to assess against the rationalised list of KPIs in Table 8-2 for the sample of 600 LEP-built schools; and secondly, to apportion the asset value criteria into categories for VfM and environmental sustainability across procurement stages: design, build, maintain and operate.

8.3.1 Criteria for whole-life asset value

Based on KPIs in the SPA and their rationalised Target Levels against UK industry standards at the time of the BSF policy, meaningful variables were selected that all LEP parties have committed to. For each criterion, specific datasets were called upon and merged into a master database using a unique identifier called LAESTAB, which is a combination of the LA number and the school establishment number. Alternatively, the school postcode was used as a unique identifier. In some instances (DEC data, floor area data and construction costs), it was not possible to find a common unique identifier. Instead, manual searches were performed and entered on the master database. Any incorrect entries or duplicates from the multiple data sources were either omitted, or correct values entered as part of the data validation process (section 6.9). Also, characteristics of old school buildings could not be included. For any data entry from an external source to make it to the master database, it had to be effective post renewal date. Each of the asset value criteria is explained in detail below.

Design Review analysis (KPI 1.3) – In 2007, the Commission for Architecture and the Built Environment (CABE) was instructed by PfS to introduce Design Reviews for each BSF school (James, 2011). The data was obtained from a publicly available CABE database[39] and the School Building Survey 2009 dataset following a request with PfS in 2012. As CABE stopped undertaking these reviews for PfS in April 2011, 136 schools were excluded from the sample of 600 as these were designed later. The remaining sample was 464 schools, of which 205 identified Design Reviews. There was no other variable in the dataset than 'Yes' or an empty

[39] CABE Design Review dataset: https://data.gov.uk/dataset/design-review-schemes-reviewed-1999-to-2011/ (visited between Oct-2014 and Mar-2016)

cell. The remaining 259 schools were therefore classified as 'unknown', implying that either there was no Design Review analysis performed or it has not been possible to get such confirmation.

Design Quality Indicators analysis (KPI 2.1) – Schools that follow the DQI evaluation process played a fundamental role in contributing to improved design, long-term functionality and sustainability. A dataset of 318 schools that conducted a DQI process was received from Construction Industry Council in November 2014. Further DQI data in the School Building Survey 2009 was obtained from PfS following a request in 2012. Ten further schools were added manually after it was found via online searches that a DQI process was applied, meaning in total 328 schools were identified. There was no other variable in the dataset than 'Yes' or an empty cell. The remaining 272 schools were therefore classified as 'unknown', implying that either there was no DQI analysis performed or it was not possible to get such confirmation.

BREEAM status analysis (KPI 2.8.1) – The Building Research Establishment (BRE) has a method to assess the performance of buildings (section 2.2.2 refers to this). LEP-built schools were required to meet or exceed the BREEAM 'Very Good' rating (James, 2011; PfS, 2008c). Data was acquired through the PfS School Building Survey 2009, the BRE 'GreenBookLive' portal,[40] and manual online searches. In total, 319 schools achieved a rating of 'Very Good or higher' (51 schools achieved rating 'Excellent'). The School Building Survey dataset displayed no other variable for a 'Very Good or higher' rating than 'Yes' or an empty cell. The remaining 281 schools were therefore classified as 'unknown', implying that either the status was Good or lower, there was no BREEAM status, or it was not possible to get such confirmation.

Building Services Type and Main Heating Fuel analysis (KPI 2.8.1) – The government's Non-Domestic Energy Performance Register[41] (NDEPC) confirms via the EPC and DEC data (see section 2.2.2) the main type of building services installation in schools: air conditioning, heating and natural ventilation, heating and mechanical ventilation, mechanical ventilation, mixed-mode with mechanical ventilation, or mixed-mode with natural ventilation. It also refers to Main Heating Fuel (MHF) data: biomass, district heating, grid supplied, natural gas, oil, and waste heat. This information was entered manually on the master database. The data mining yielded 508 entries, of which 312 were of a building services installation type 'natural ventilation' or 'predominantly heating with natural ventilation'. In addition, 100 entries related to the more sustainable MHFs: biomass, district heating, grid supplied or waste heat. The remaining 92 schools were missing values classified as 'unknown', implying that either no installation type/MHF was confirmed, or it was not possible to access the data.

Display Energy Certificate analysis (KPI 2.8.2) – Since 2008, regulations require schools with a Total Usable Floor Area (TUFA) >1,000m^2 to have a DEC, based on actual measured

[40] BRE GreenBookLive portal: http://www.greenbooklive.com/search/scheme.jsp?id=202 (last visited: Apr-2015)
[41] NDEPC register: https://www.ndepcregister.com (visited between Oct-2014 and Mar-2016)

annual energy consumption (see section 2.2.2). DEC data is publicly available via manual online entry on the NDEPC register. In total, 373 valid DEC ratings post school renewal date were extracted. The CIBSE TM46 energy benchmarks for DECs were utilised. Based on a typical performance for the type of building, the operational DEC rating benchmark is 100. A DEC rating ≤100 (equal to or lower than the benchmark) is a reasonable reflection of energy efficiency. Following the data mining, 216 schools in total met this criterion. DEC ratings were captured on the master database annually, with the latest DEC rating received post renewal as representative for the appraisal. There were 227 missing values, either because no years had elapsed yet post renewal, or no DECs were captured by NDEPC for those years. The DEC ratings take into account the geographical conditions and weather conditions. If a school had multiple DECs for its buildings on site, then an average was taken. This average rating was not adjusted for TUFA of each building because this detail was not available in the data.

Construction time analysis (KPI 3.3) – This is the balance between contract award and construction completion date (calendar month and year). Dates were obtained from multiple sources: DfE BSF Schools List 2010;[42] PfS School Building Survey 2011 following a request with PfS in 2012; FAME online company database;[43] and HM Treasury PFI projects list 2014.[44] Further web searches and direct information requests with LEPs were performed to fill data gaps. The total yielded 541 contract award dates, 593 practical completion dates, and 540 schools with construction time (duration in months). There were 60 missing values.

Construction capital cost analysis (KPI 4.1) – Capital cost data was gathered from multiple sources including: a BSF schools list received from EFA under an NDA in 2014; the DfE Basic Need Scorecard and dataset 2010/11 to 2012/13;[45] the confidentially provided BSFI Technical Memorandum of March 2011; and PfS School Building Survey 2009. In addition, manual internet searches were performed to fill missing values or LEPs were approached directly with requests to confirm or verify the data. To enable comparison, the cost data was normalised per m^2 TUFA (£/m^2), indexed to July 2010 price levels using BCIS cost indices (discussed in detail in section 6.5.3). Capital cost data was presented excluding capitalised costs (interest and fees). Finally, a full validation exercise was performed by Amber Infrastructure, a private equity fund that acquired the 10% central government stake in most LEPs in 2011. Out of the sample set of 600 schools, there were 585 entries for capital costs, and 551 when normalised per m^2 and indexed at the appropriate year of contract award.

Cost analyses for hard FM, soft FM, and energy (KPI 4.5.1 to 4.5.5 and 5.4.5) – Ten years of raw CFR datasets from 2005/06 to 2014/15 were obtained from the DfE website.[46] Cost

[42] BSF school list: http://news.bbc.co.uk/1/shared/bsp/hi/pdfs/19_07_10_school_error_list.pdf (last visited: Oct-2013)
[43] FAME database: https://fame.bvdinfo.com (visited between Jan-2012 and Dec-2015)
[44] HM Treasury PFI projects list: https://www.gov.uk/government/publications/private-finance-initiative-projects-2014-summary-data (visited: Dec-2014)
[45] DfE Basic Need Scorecard and dataset: https://www.gov.uk/government/publications/primary-school-places-local-authority-basic-need-scorecards (visited: Aug-2014)
[46] DfE Schools performance & financial data (CFR & SFR): https://www.compare-school-performance.service.gov.uk (visited between Jan-2013 and Jan-2016). A detailed description of the E## reference codes is in **Appendix J3**.

baskets were created for hard FM staff (E04), building maintenance (E12) and grounds maintenance (E13), soft FM catering staff and supplies (E6, E25), cleaning and caretaking (E14) combined, and one for all energy costs (E16). For each basket, the annual combined total cost was indexed to July 2010 price levels using cost indices from BCIS. The cost data was normalised per m² internal floor area and rearranged using the renewal date as a point of reference (instead of financial year in the CFR reporting). Only the years elapsed following renewal were analysed using time series. For each school, an average was taken from years in operation post renewal. Additional data sources were needed for the time-series analyses, such as m^2 of TUFA available from the EPC and DEC database, construction completion dates (to calculate years post renewal), and cost indices.

After analysing the data line by line, it was found that a number of data points were unrealistically low or high. These were included as part of the analysis. The extremes could be excluded by filtering any values higher than the 10th percentile and lower than the 90th percentile range; however, that would significantly reduce the sample. The low values may be because of errors in the source data, or because of errors in other entries (e.g. TUFA or renewal date). Out of the sample set of 600 schools, there were 450 entries for total hard FM costs/m^2/year, 451 entries for total soft FM costs/m^2/year, and 408 entries for total energy costs/m^2/year. The balances were missing values, either because no years had elapsed yet post renewal, or no cost entries were captured on the CFR datasets for those years.

Post Occupancy Evaluation analysis (KPI 5.3) – POE for schools include a peer review by design and sustainability professionals and an assessment of environmental and resilience performance (see section 2.2.2). In total, 137 POE markers were extracted from the PfS School Building Survey 2009, a further 18 schools were added as a result of POE feedback recorded on the DQI dataset, plus 8 manual entries following online searches, making a total of 163 POEs carried out. There was no other variable in the dataset than 'Yes' or an empty cell. The remaining 437 schools were therefore classified as 'unknown', implying that either no POE analysis was performed or it was not possible to get such confirmation.

Type of school provision analysis (KPI 6.2) – Developing schools that have extended or external facilities for outside curriculum activities and/or community use was one of the BSF objectives. The DfE CFR datasets 2006/07 to 2014/15 contain various annualised costs for extended schools income and expenditure. These are representative indicators of a school's offering for community and/or extended provision based on an assumed turnover of more than £1,000 per annum. This yielded 225 schools. The remaining schools were identified using online manual searches on school websites, with the web page links copied in the master database as a reference. In total 430 extended schools were found with the remaining 170 classified as schools with standard provision.

8.3.2 Establishing whole-life asset value criteria

Each of the rationalised KPI contract criteria identified in section 8.3.1 can measure either VfM or environmental sustainability performance of LEP-built schools. They can be apportioned to each of the procurement stages: design, build, maintain and operate. These criteria may help to better understand how contracted VfM and environmental sustainability considerations impact on the design, build, maintenance and operation of social infrastructure assets. After correcting for any errors and missing values, Table 8-3 and Table 8-4 summarise each criterion, the total number of school data entries gathered, the rationalised performance expectation set that can explain this 'impact', and a scale of analysis: binary ordinal, nominal, interval or numerical. While it was possible to apportion each asset value criterion to a category and a procurement stage, these are often composed of a combination of variables from various data sources. The use of the filtered dataset as per the summary tables below for any further analyses were only based on very crude statistics, because the data had to be cleaned, refined and manipulated after it was transferred from the source dataset into the master database.

School-level data total sample = 600		**Whole-life asset value criteria**	
		Value for money	**Environmental sustainability**
Procurement stages	**Design**	**Design Reviews (205 entries)** Reviews conducted based on data collected. (binary marker: 'yes' or 'unknown')	**Design Quality Indicators (328 entries)** DQI processes based on the data collected. (binary marker: 'yes' or 'unknown')
	Build	**Construction time (540 entries)** ≤24 months for new build secondary schools, or ≤32 months for refurbished. For primary schools it is ≤18 and ≤24 months respectively. (interval range: number of calendar months)	**BREEAM status (319 entries)** **Building Services type (508 entries)** **Main Heating Fuel (508 entries)** Achieved BREEAM Very Good or better, or a building services type 'natural ventilation' or 'predominantly heating with natural ventilation', and MHF biomass, waste heat, district or grid. (nominal: 15 categories including 'unknown')
	Maintain	**Average total hard FM cost**[47] **(450 entries)** **Average total energy costs**[47] **(408 entries)** Schools that have hard FM cost ≤£24.90 per m^2/yr, or total energy cost ≤£9.60 per m^2/yr BCIS national average benchmarks. (numerical: costs £/m^2/yr greater than 0)	**Display Energy Certificates (373 entries)** The industry norm is that a typical building of its type would have a DEC rating of ≤100. (numerical: rating greater than 0)
	Operate	**Average total soft FM cost**[47] **(451 entries)** Schools that have soft FM costs ≤£31.40 per m^2/yr BCIS national average benchmarks. (numerical: costs £/m^2/yr greater than 0)	**Post Occupancy Evaluations (163 entries)** Commitment to POEs based on data collected. (binary marker: 'yes' or 'unknown')

Table 8-3: Whole-life asset value criteria assumptions against each procurement stage

Capital expenditure (capex)	**Type of provision**
Capital cost (£/m^2) ≤ benchmark[48] **(265 entries)** Schools with capital cost £/m^2 less than or equal to indexed Cabinet Office average national benchmarks, or BCIS average for refurbishments. (numerical: costs £/m^2 greater than 0)	**Extended and/or community provision (430 entries)** Schools that offer extended/external facilities for pupils or community use, such as youth/sports clubs or venue hire. (binary marker: 'extended' or 'standard')
Capital cost (£/m^2) > benchmark[48] **(286 entries)** Schools with capital cost £/m^2 exceeding Cabinet Office indexed average national benchmarks, or BCIS average for refurbishments. (numerical: costs £/m^2 greater than 0)	**Standard provision (170 entries)** Any schools that have a standard provision only, including nurseries and Special Educational Needs schools. (binary marker: 'extended' or 'standard')

Table 8-4: Performance differentiators for any LEP-built schools

[47] Based on standard KPI to achieve 20% below BCIS indices at June 2010 and location factors (section 6.5.3).
[48] Based on Government Construction Cost Benchmarks 2014 (Cabinet Office), with BCIS indices at June 2010 and location factors applied for London versus the rest of England (section 6.5.3).

Differentiators for capital expenditure and type of provision are included in Table 8-4 to allow for a like-for-like comparison and control for these factors in the appraisals. Quantities for any criteria comprising multiple variables (for example, one VfM criterion at maintenance stage is to have total hard FM costs or total energy costs ≤ BCIS benchmarks) were calculated using compounded filter functions in Excel.

8.4 Asset value criteria – basic relationships

A number of possible relationships between the asset value criteria in Table 8-3 and the performance differentiators in Table 8-4 are explored. Regression was used as a statistical method to explain how much of the variability of one asset value criterion can be caused or explained by its relationship to another criterion. Various scatterplots with regression lines and box-and-whisker plots are drawn from the data to explore the significance of relationships between various asset value criteria. In **Appendix M1** a number of relationships are displayed in graphs with a regression line and a calculated significance co-efficient (R^2). Table 8-5 summarises a number of basic relations that have cost criteria normalised at £/m^2 or £/m^2/year. This is to control for any obvious relations. For example, total hard FM costs rise when the TUFA of schools increase.

Asset value criterion 1	Asset value criterion 2	R^2 value PFI	R^2 value non-PFI	R^2 value refurb
Capex £/m^2	TUFA m^2	0.1455	0.0915	0.0249
Capex £/m^2	Total hard FM cost £/m^2/yr	0.1040	0.0022	0.0831
Capex £/m^2	Total soft FM cost £/m^2/yr	0.0254	0.0349	0.0218
Capex £/m^2	Total energy cost £/m^2/yr	0.0455	0.0004	0.1151
Total hard FM cost £/m^2/yr	TUFA m^2	0.0289	0.0295	0.0418
Total soft FM cost £/m^2/yr	TUFA m^2	0.0263	0.1419	0.1345
Total energy cost £/m^2/yr	TUFA m^2	0.0887	0.0562	0.0573
Total energy cost £/m^2/yr	DEC rating	0.0471	0.0188	0.1216
Capex £/m^2	DEC rating	0.0600	0.0038	0.0279
DEC rating	TUFA m^2	0.0379	0.0093	0.0034

Table 8-5: Relationship table of asset value criteria

Given the low R^2 values in Table 8-5, there are no very obvious trade-offs and possible payoffs – i.e. invest in more capex £/m^2 to reduce downstream opex in hard or soft FM £/m^2/year. The same applies to investing in more sustainable building options (DQI, BREEAM, natural ventilation, biomass, BREEAM etc.) to save on energy costs or achieve lower DEC ratings.

One more significant influencing factor is the total capital cost of a school building, where the size of a school clearly affects not only the building cost (Figure 8-1) but also the costs per m^2. When ignoring for location factor (London versus the rest of England), Figure 8-2 shows that a logarithmic pattern was observed from the initial data analyses of the PFI new build schools, where the cost per m^2 is larger for small sites. The analysis confirms that in order to control for this relationship, there should be separate benchmarks for capital cost of smaller (primary) and bigger (secondary) schools. Similar results following statistical modelling were obtained by PfS in a presentation to BCIS in June 2010, showing that the economies of scale follow a logarithmic function (**Appendix M2**).

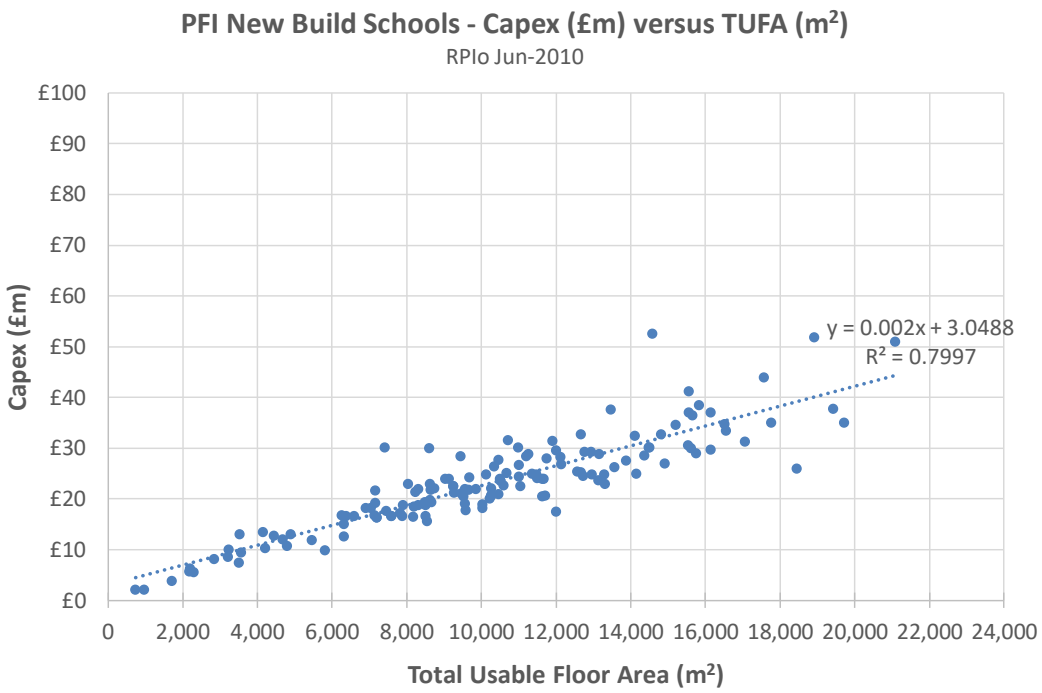


Figure 8-1: Variation of capital cost in the size of schools

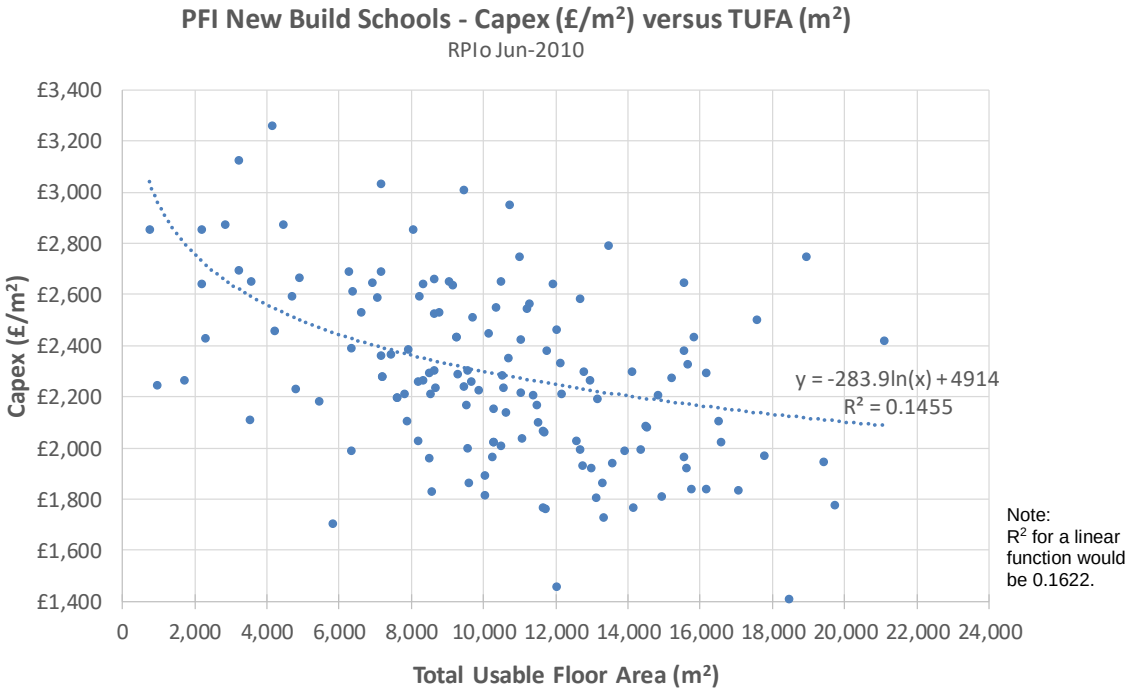


Figure 8-2: Variation of capital cost per m² in the size of schools

A further reason for exploring relationships is to link the criteria to various procurement stages, especially between build and maintain stages. For example, with an asset criterion during the build stage (e.g. BREEAM) versus maintain stage (e.g. DEC), it is interesting to see whether schools built with a BREEAM score 'Very Good'+ typically produce DECs that predominantly score 100 or lower. The three box-whisker plots in Figure 8-3 show that on average (indicated by 'x') new build schools achieve DEC ratings below 100, with both the box representing 50% of the data points remaining close to 100 rate for PFI schools achieving BREEAM Very Good.

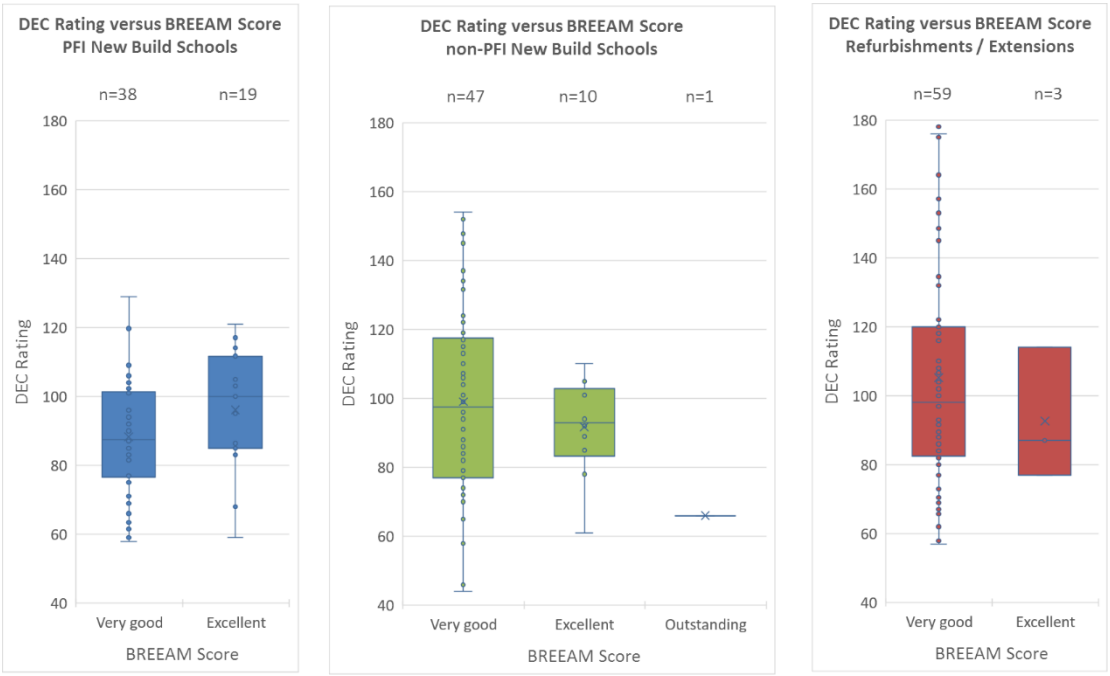


Figure 8-3: Variation of DEC ratings versus BREEAM scores

A higher DEC rating versus a BREEAM Excellent score for PFI new build schools is somewhat counterintuitive. This may be explained by overdesigning those building services that score BREEAM points but do not necessarily yield a reduction in energy consumption (e.g. biomass).

A number of other influencing variables to take into account are: type of education (secondary or primary schools), type of investment (new build, refurbishment, or extension), procurement option (PFI or non-PFI), and location (London versus other parts of England). It is reasonable to assume that buildings in London will be more expensive to build than elsewhere in England. It is also reasonable to assume without any further data analysis that there are economies of scale (bigger schools) and diseconomies of scale (smaller schools). Likewise, schools with a higher flexibility of space and adaptability of use (extended provision) will be more expensive than fixed space/use (standard provision) although, when normalised per m^2, graph 14 in **Appendix M1** suggests this is not the case. Finally, construction time of a larger school is longer than the construction time of smaller schools, as would be reasonably expected.

Many of these influencing factors will also be of assistance when explaining the findings in chapter 9, where better- versus worse-performing LEPs will be selected based on either meeting or failing a set of asset value criteria across multiple procurement stages.

8.5 Outcomes of the asset-level appraisal

MCA was applied as a research tool for the asset-level appraisals (section 6.5.4). Using compounded filter functions and pivot tables in Excel, it was possible to produce ratios to give an indication of the relative effectiveness of the standard LEP model in delivering assets to contracted performance criteria at each procurement stage and throughout their life. A 'net effect ratio' is calculated as a percentage of the number of schools that meet criteria set against

the total sample, after correction for any errors and missing data. Ratios can help to better understand if LEP-built schools can meet the requirement to be both VfM and environmentally sustainable during the full asset life. A ratio over 50% is considered high because it indicates that more than half of the net sample of LEP-built schools achieve an asset value criterion (or combined criteria). Reversely, a ratio below 50% is considered low.

It was possible to conduct an appraisal for each of the asset value criteria against their Target Levels (Table 8-2 and 8-3). After correcting for any errors and missing values in the datasets, frequencies and ratio outputs were extracted as shown in the subsections below and in Tables 8-6 and 8-7. These tables present the separate results at each procurement stage for all 600 schools. Four scenarios are displayed, using the performance differentiators of Table 8-4.

Tables 8-6 and 8-7 show only low net effect ratios of schools that meet all VfM or all environmental sustainability criteria across the asset life: DBMO. As for whole-life VfM criteria, extended schools with a capital cost (£/m^2) equal to or lower than average national benchmarks show higher net effect ratios (22%) versus higher capex schools with standard provision only (8%). The level of capital investment had only limited impact on whole-life environmental sustainability criteria (19% vs 13% respectively).

8.5.1 Delivering whole-life VfM criteria

The net effect ratios shown in Table 8-6 give an empirical indication of how effective the LEP model has been to date in delivering contracted VfM criteria at each procurement stage and throughout the asset life, after correction for errors and missing data. Figure 8-4 and Figure 8-5 show the ratios broken down further by type of investment (new build versus refurbishment) and funding route (PFI versus non-PFI). Areas marked blue represent the average net effect ratios in Table 8-6, before controlling for the type of investment (new build and refurbishment) and procurement option (PFI and non-PFI).

Observing the procurement stages individually with Table 8-6, average net effect ratios can vary between 23% (at design stage) and 94% (at operate stage). Differences between the ratios may be further explained by interpretation of the graphs displaying only the lower capex extended schools versus higher capex standard schools from Table 8-4. These are selected because each graph displays very distinct configurations to resemble what could be both criticism of BSF (too expensive schools) and aims of BSF (extended/community use).

The categorisation (by type of provision and capex £/m^2) has reduced the sample size of 600 LEP-built schools to 551. The numbers in brackets behind the legend in Figures 8-4 and 8-5 are school quantities after applying compounded filters, to isolate from the representative sample size of 551 schools their respective subset: type of investment or procurement route. Percentages in the graphs resemble net effect ratios relative to each subset. For example, 78% of PFIs at a capital cost (£/m^2) equal to or lower than average national benchmarks are built within ≤24 months for extended secondary or ≤18 months for extended primary schools.

Sample: 551 LEP-built schools	Appraisal of VfM criteria against contracted Target Levels												
Procurement stage	**Lower capex (£/m²), extended**			**Lower capex (£/m²), standard**			**Higher capex (£/m²), extended**			**Higher capex (£/m²), standard**			**Errors and missing data**
	Count	**Net sample***	**Net effect ratio****	**Count**	**Net sample***	**Net effect ratio****	**Count**	**Net sample***	**Net effect ratio****	**Count**	**Net sample***	**Net effect ratio****	
DESIGN (Design Reviews)	70	152	46%	21	44	48%	101	208	49%	9	40	23%	107
BUILD (Construction time)	137	175	78%	49	67	73%	159	191	83%	58	64	91%	54
MAINTAIN (Hard FM or energy cost)	146	158	92%	43	50	86%	175	197	89%	37	40	93%	106
OPERATE (Soft FM costs)	148	158	94%	42	49	86%	184	197	93%	33	40	93%	107
WHOLE-LIFE (DBMO) (All VfM criteria combined)	33	148	22%	10	44	23%	49	171	29%	3	37	8%	151

Table 8-6: Output appraisal of LEP-built schools meeting VfM criteria

Sample: 551 LEP-built schools	Appraisal of environmental sustainability criteria against contracted Target Levels												
Procurement stage	**Lower capex (£/m²), extended**			**Lower capex (£/m²), standard**			**Higher capex (£/m²), extended**			**Higher capex (£/m²), standard**			**Errors and missing data**
	Count	**Net sample***	**Net effect ratio****	**Count**	**Net sample***	**Net effect ratio****	**Count**	**Net sample***	**Net effect ratio****	**Count**	**Net sample***	**Net effect ratio****	
DESIGN (DQIs)	114	190	60%	27	75	36%	140	219	64%	32	67	48%	0
BUILD (BREEAM or Services & MHF)	111	176	63%	33	71	46%	146	213	69%	36	63	57%	28
MAINTAIN (DECs)	75	124	60%	30	46	65%	87	154	56%	18	39	46%	188
OPERATE (POEs)	53	190	28%	17	75	23%	70	219	32%	18	67	27%	0
WHOLE-LIFE (DBMO) (All environmental sustainability criteria combined)	23	124	19%	1	46	2%	17	154	11%	5	39	13%	188

Table 8-7: Output appraisal of LEP-built schools meeting sustainability criteria

* Net sample means the representative sample size corrected to exclude any errors and missing data.

** Any net effect ratio more than 50% is considered high because it indicates that more than half of the net sample of LEP-built schools achieve the asset value criterion (or combined criteria). Reversely, any net effect ratio equal to or below 50% is considered low.

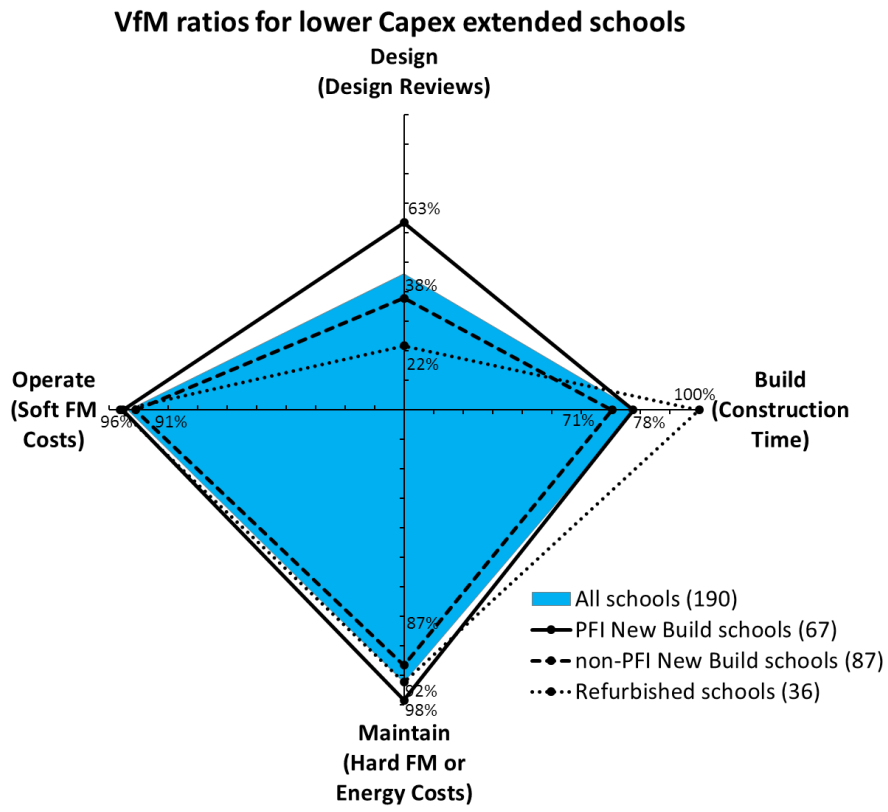


Figure 8-4: Net effect ratios of VfM criteria in lower capex extended schools

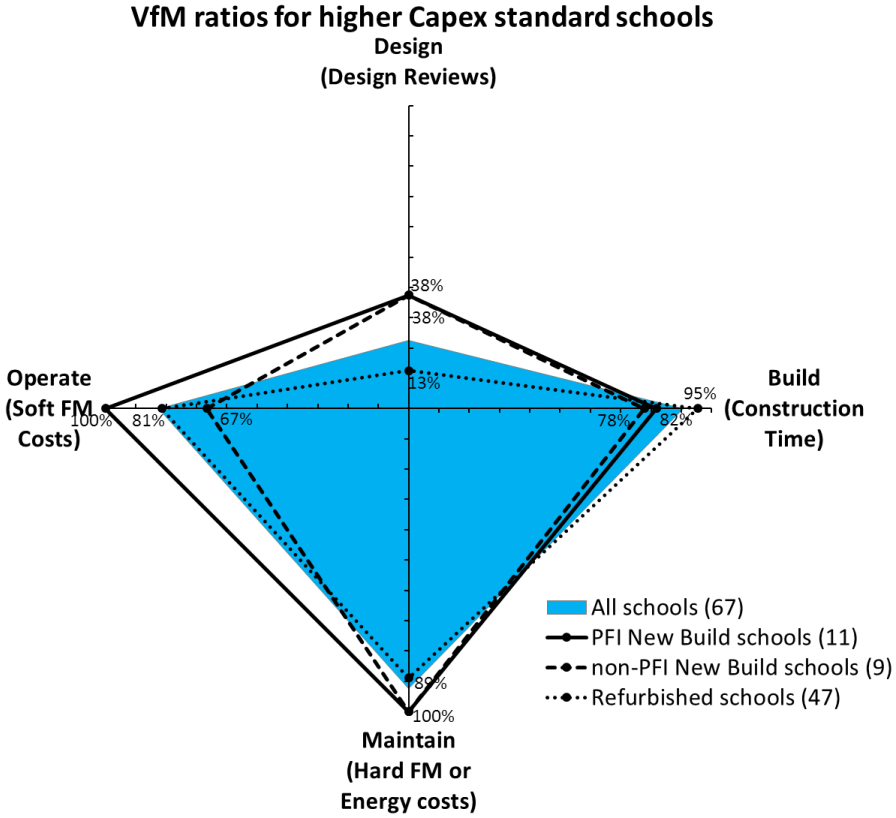


Figure 8-5: Net effect ratios of VfM criteria in higher capex standard schools

By analysing Figure 8-4, it can be observed that ratios for PFI schools at lower capex extended provision match or exceed average ratios at all procurement stages, while non-PFI new build and refurbished schools (except construction time) yield average levels or lower. Ratios are more inconsistent in Figure 8-5, where net effect ratios of VfM criteria fluctuate across the asset life. At design stage, all ratios of schools conducting Design Reviews are relatively low regardless of investment type and procurement option, except for lower capex extended schools where some 63% of the PFI schools met the asset value criterion. In both graphs, construction time ratios for refurbished schools outweigh the average. This may be caused by too lenient KPI Target Levels as referred to in Table 8-2. PFI schools score very high VfM net effect ratios at build, maintain and operate stages in both graphs, though all ratios are high regardless of the investment type and procurement option.

A final observation by comparing both graphs is that in both subsets, high ratios are achieved at individual procurement stages, but the volatility is most pronounced at design (41%) and build (29%) for lower capex extended schools and at design (25%) and operate stage (33%) for higher capex standard schools. The design stage volatility might be explained by the fact that Design Reviews were less encouraged for refurbishments. Finally, both graphs show PFI schools yield net effect ratios >50% across all stages, a sign of commitment to whole-life value.

8.5.2 Delivering whole-life environmental sustainability criteria

The net effect ratios in Table 8-7 give an empirical indication of how effective the LEP model has been to date in achieving contracted environmental sustainability criteria at individual procurement stages and through the asset life, after correction for any errors and missing data. As in the former section, Figures 8-6 and 8-7 show the ratios broken down further by type of investment (new build versus refurbishment) and procurement route (PFI versus non-PFI). Areas marked green represent the average net effect ratios in Table 8-7, before controlling for type of investment (new build and refurbishment) and procurement option (PFI and non-PFI).

Observing the individual procurement stages with Table 8-7, average net effect ratios can vary between 69% (at build stage) and 23% (at operate stage). Differences between ratios may be further explained by interpretation of the graphs displaying only lower capex extended schools versus higher capex standard schools from Table 8-4. These are selected because each graph displays very distinct configurations which resemble both the criticism of BSF (too expensive schools) and aims of BSF (extended and/or community provision).

The categorisation (by type of provision and capex £/m^2) has reduced the sample size of 600 LEP-built schools to 551. The numbers in brackets behind the legend in the figures are frequencies after applying compounded filters, to isolate from the sample of 551 schools their respective subset: type of investment or procurement route. Percentages shown resemble net effect ratios relative to each subset. For example, 70% of all extended PFI schools with capital cost (£/m^2) equal to or lower than average national benchmarks achieve DEC ratings of ≤100.

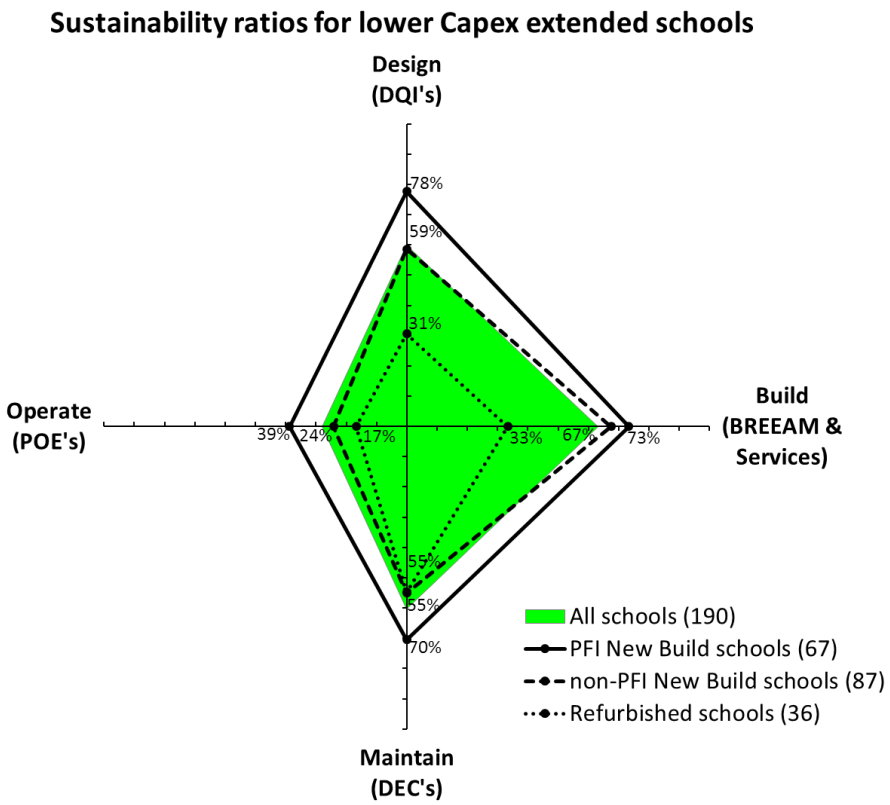


Figure 8-6: Net effect ratios of sustainability criteria in lower capex extended schools

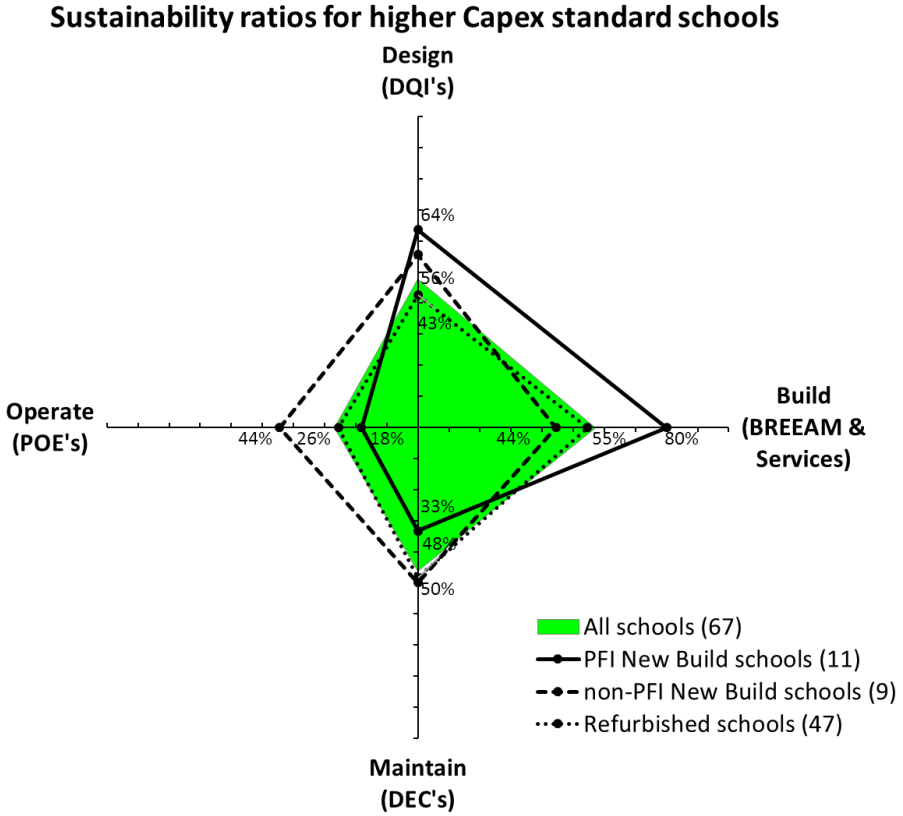


Figure 8-7: Net effect ratios of sustainability criteria in higher capex standard schools

It can be observed from Figure 8-6 that PFI schools with extended provision at lower capital costs have significantly higher net effect ratios across the asset life. Sustainability ratios of non-PFI new build lower capex schools with extended provision are close to average across the full asset life, while refurbished schools are consistently below average. This could mean refurbishment projects are less incentivised to meet whole-life asset value criteria. Figure 8-7 shows refurbished schools have net effect ratios of sustainability at or below average despite the higher amount of capital investment. This might imply that spending more (£/m^2) on refurbishments does not enhance performance against the whole-life asset value criteria.

The various procurement options/investment types yield very consistent ratios in Figure 8-6. Figure 8-7 has inconsistencies for PFI schools with higher net effect ratios at the design (64%) and build (80%) stages but lower ratios at maintain (33%) and operate (18%) stages. Ratios also fluctuate for non-PFI new build schools. Reasons for the fluctuations need to be explored.

A final observation by comparing both graphs is that in both subsets, very high ratios are not achieved at individual procurement stages (except for lower capex extended PFI schools). The volatility is higher and more pronounced at design (47%) and build (40%) stages for lower capex extended schools, and at build (36%) and operate (28%) stages for higher capex standard schools. The latter might be explained in part by the fact that since BSF was cancelled, there has been a low take-up on POEs.

8.5.3 Delivering whole-life VfM and sustainability criteria combined

The legacy BSF policy aimed to achieve buildings procured through LEPs to be both VfM and environmentally sustainable across the whole asset life. This section presents the results of the appraisals when requiring LEP-built schools to meet both whole-life VfM and environmental sustainability criteria combined. Net effect ratios in Table 8-8 give an indication of how effective the LEP model has been to date in delivering the combined criteria at each single procurement stage and throughout the full asset life.

The most significant observation following analysis of Table 8-8 is that, across the asset life, extended PFI schools built to either a lower capex (£/m^2) or a higher capex (£/m^2) perform at substantially better net effect ratios (21% and 22% respectively) compared to non-PFI schools (6% and 0%). Schools with standard provision delivered at a higher capex (£/m^2) did not yield a combined net effect ratio for any of the procurement options (PFI and non-PFI). Thus, it can be concluded that extended schools yield higher net effect ratios than standard schools. Furthermore, Table 8-8 shows that numbers are very low when comparing the frequency outputs of schools meeting the combined criteria: 11 lower capex extended schools and 10 higher capex standard schools. Figure 8-8 and Figure 8-9 show how these frequencies compare against schools meeting whole-life asset value criteria for either VfM or environmental sustainability. There is a 150% to 200% drop in schools meeting the combined criteria compared to environmental sustainability criteria only, and a 300% to 500% drop in schools meeting combined criteria compared to VfM criteria.

Total sample: 551 LEP-built schools	Appraising VfM and sustainability criteria combined against Target Levels												
Procurement stage	**Lower capex (£/m²) schools with extended provision**			**Lower capex (£/m²) schools with standard provision**			**Higher capex (£/m²) schools with extended provision**			**Higher capex (£/m²) schools with standard provision**			**Errors and missing data**
	Count	**Net sample***	**Net effect ratio****	**Count**	**Net sample***	**Net effect ratio****	**Count**	**Net sample***	**Net effect ratio****	**Count**	**Net sample***	**Net effect ratio****	
DESIGN (Design Reviews with DQIs)	63	158	40%	15	51	29%	89	210	42%	9	47	19%	85
BUILD (Construction time with BREEAM, or Services Type & MHF)	110	161	68%	40	63	63%	142	187	76%	49	60	82%	84
MAINTAIN (Hard FM or energy cost criteria, with DECs)	54	109	50%	14	34	41%	55	143	38%	5	21	24%	244
OPERATE (Soft FM cost criteria, with POEs)	47	158	30%	11	49	22%	64	197	32%	11	40	28%	107
DBMO (combined 551 schools)	11	100	11%	1	30	3%	10	121	8%	1	20	5%	280
PFI new build (145 schools)	9	43	21%	1	6	17%	8	37	22%	0	4	0%	55
Non-PFI new build (187 schools)	2	35	6%	0	12	0%	0	24	0%	0	3	0%	113
Refurbished (219 schools)	0	22	0%	0	12	0%	2	60	3%	1	13	8%	112

Table 8-8: Output appraisal of VfM and sustainability criteria combined

Total sample: 600 LEP-built schools	Appraising VfM and sustainability combined without categorisation			
Procurement/investment option	**Count**	**Net sample***	**Net effect ratio****	**Errors and missing data**
DBMO (all stages combined)	23	275	8%	325
PFI new build (147 schools)	18	90	20%	57
Non-PFI new build (196 schools)	2	75	3%	121
Refurbished (257 schools)	3	110	3%	147

Table 8-9: Output appraisal of VfM and sustainability criteria by procurement option

* Net sample means the representative sample size corrected to exclude any errors and missing data.
** Any net effect ratio more than 50% is considered high because it indicates that more than half of the net sample of LEP-built schools achieve the asset value criterion (or combined criteria). Reversely, any net effect ratio equal to or below 50% is considered low.

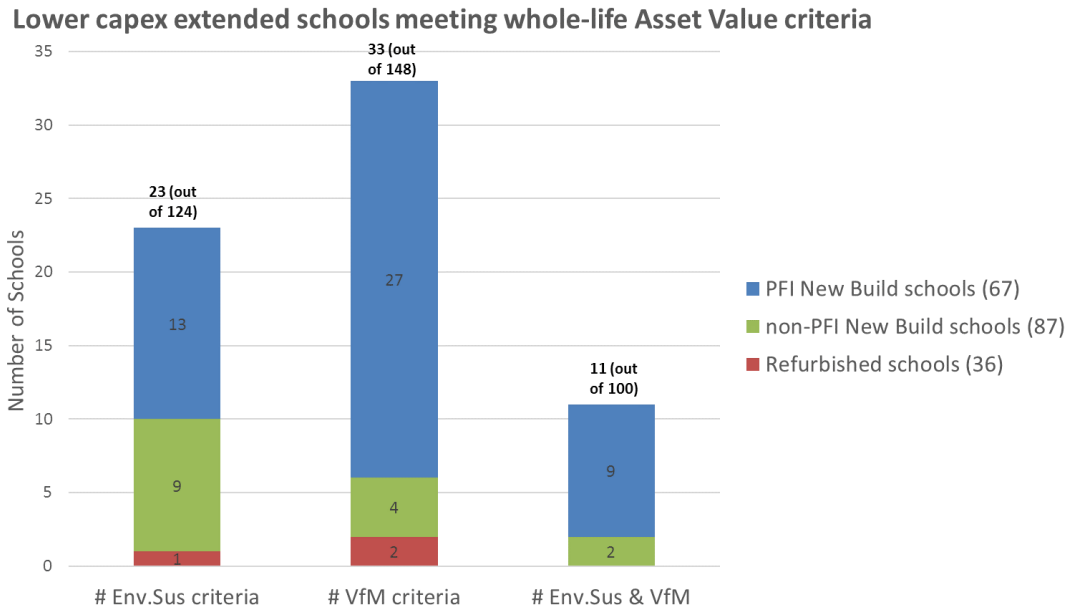


Figure 8-8: Number of lower capex extended schools meeting whole-life value criteria

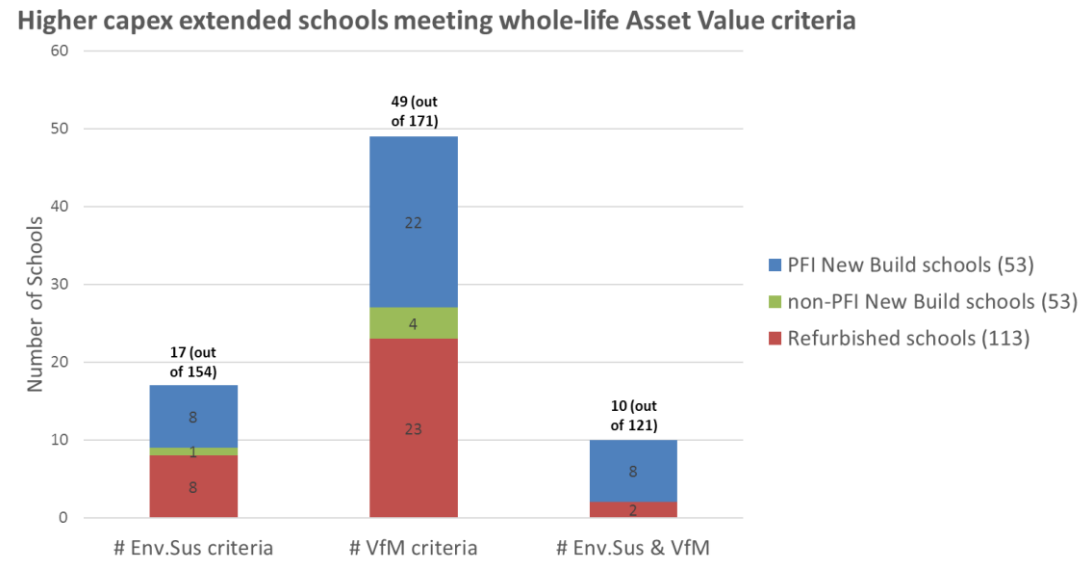


Figure 8-9: Number of higher capex extended schools meeting whole-life value criteria

Net effect ratios for the combined whole-life asset value criteria are plotted in Figure 8-10 for the various categorisation scenarios (capex and type of provision). The area marked purple represents the average net effect ratios, ignoring the effect of a school's capex (higher or lower cost £/m^2) and type of provision (extended or standard). The most significant observation is that lower capex extended schools score average or higher net effect ratios across the asset life, while higher capex standard schools score ratios that are average or lower. This might imply that schools built by LEPs at higher capital costs do not necessarily perform better against their whole-life asset value criteria compared to those built at a lower capital cost.

When ignoring the effect of a school's capex and type of provision, the number of schools that meet the whole-life asset value criteria increase to a degree as set out in Table 8-9. The outputs have been calculated as net effect ratios and frequencies, and the result of which across the asset life is shown in Figure 8-10 and Figure 8-11.

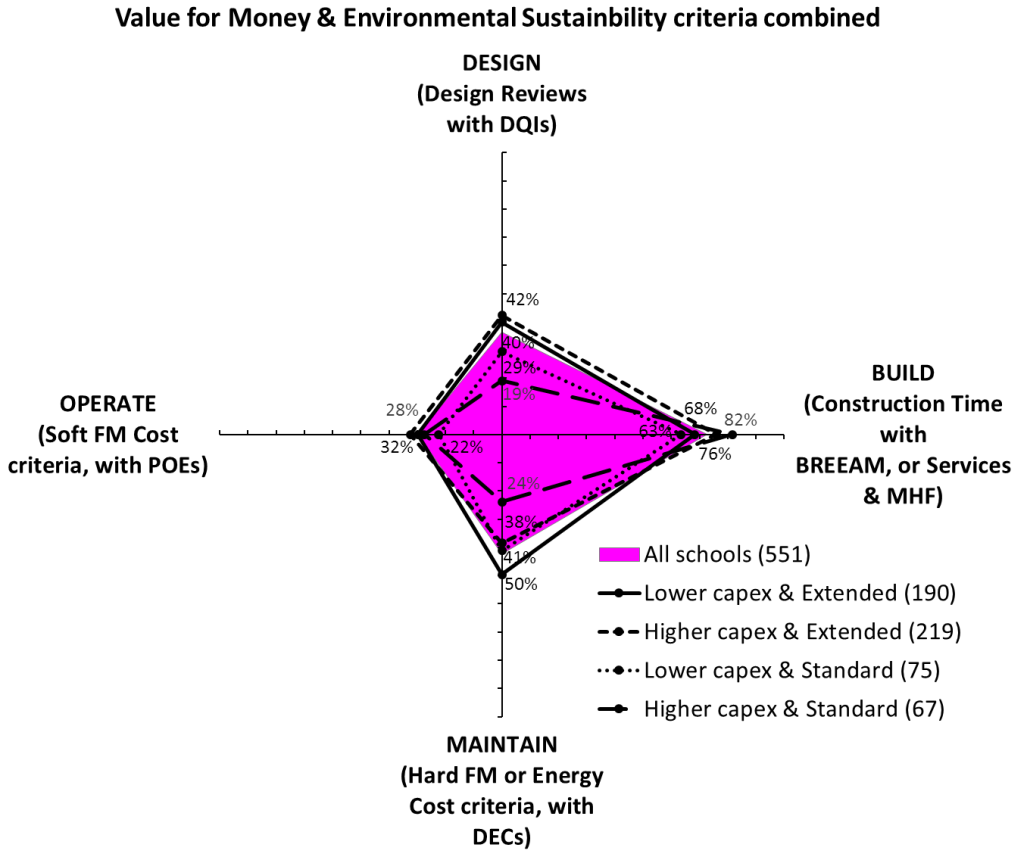


Figure 8-10: Net effect ratios all asset value criteria, by capex & type of provision

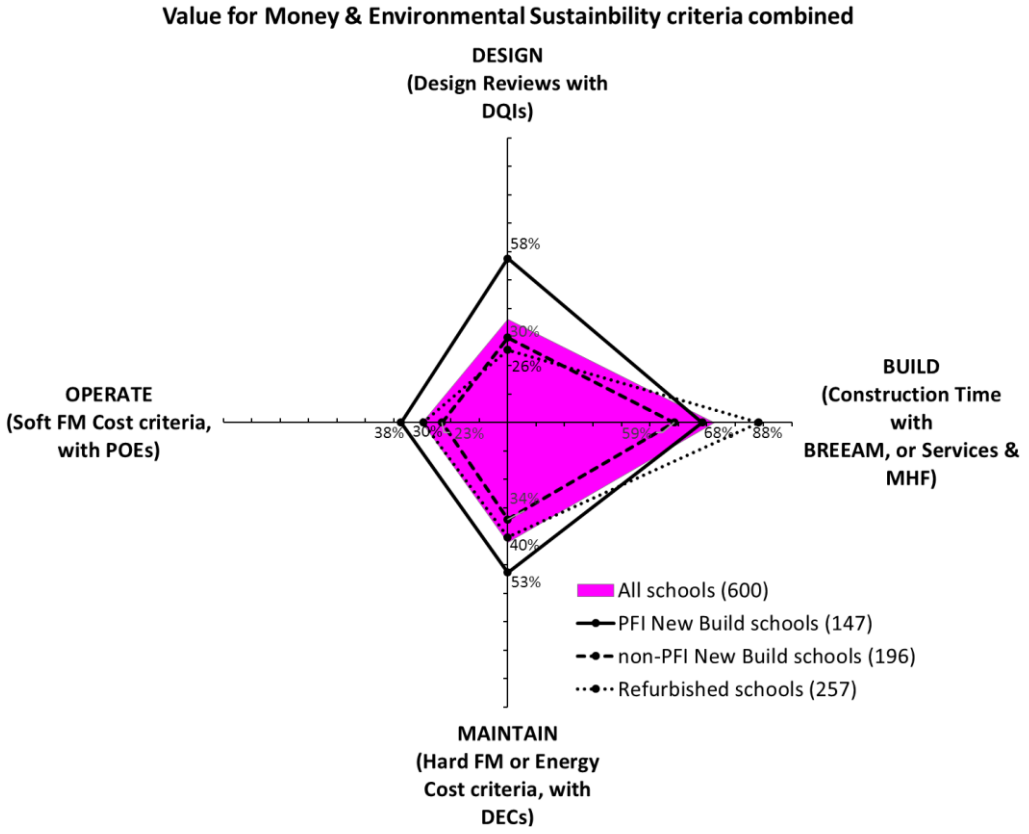


Figure 8-11: Net effect ratios all asset value criteria, by investment type & procurement

By analysing the individual procurement stages in Figure 8-11, it can be furthermore observed that PFI new build schools score ratios well above average (except at build stage), while non-PFI new build schools yield ratios consistently below average. The reason for this could be caused by the fact that PFI schools have long-term M&O risks transferred to the private sector with a penalty regime in place if performance drops.

For future research, it might be interesting to include plots to Figures 8-4 to 8-11 of traditionally procured schools built after 2000 but prior to BSF, to compare them with the LEP-built schools. One could also include schools that are over 15 years old and have never been refurbished. LEP-built schools were supposed to meet both VfM and environmental sustainability criteria during the whole asset life; however, both Figure 8-11 and Figure 8-12 do not give confidence. Putting these into context with schools built in a different era and to a different policy might provide a more objectively substantiated picture.

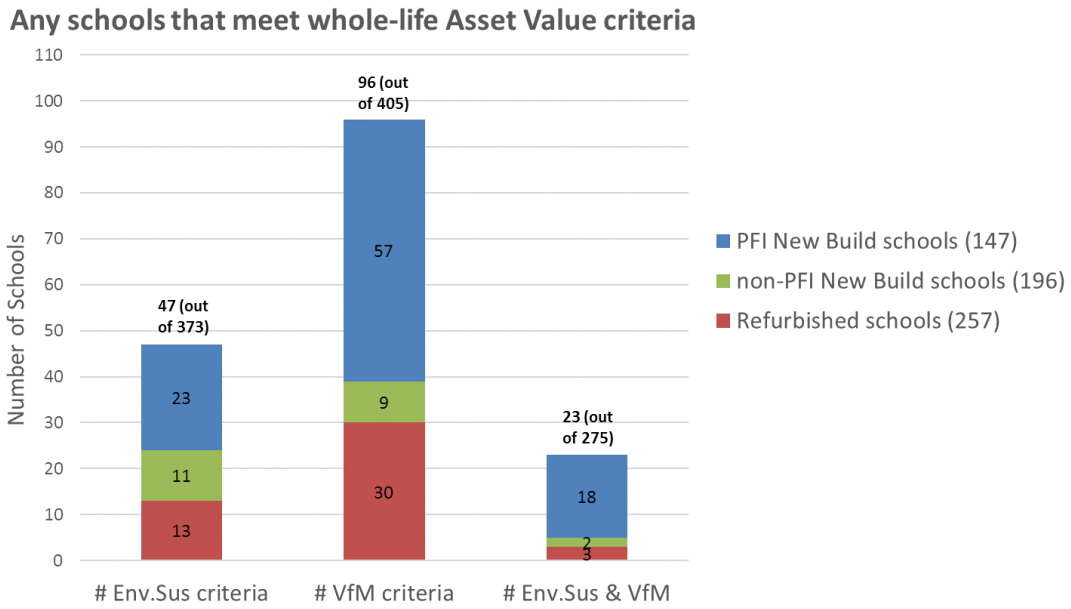


Figure 8-12: Schools meeting whole-life asset value criteria, without controlling factors

The number of schools in Figure 8-12 are extracted from Table 8-9. Those that meet all environmental sustainability and VfM criteria are low (only 23 out of 275 schools); however, the multiple variables adopted in the dataset that make the combined whole-life asset value criteria are subject to a lot of missing data and errors. The proxy with the lowest number of entries in Table 8-3 is POEs (163 for POEs, after correcting for any missing data and errors). This makes it a reliable denominator when ignoring categorisation scenarios (capex and type of provision). Hence 23 out of 163, or 14%, of the LEP-built schools achieve the contractual challenge of BSF requirements of schools meeting targets for both VfM and environmental sustainability across the full asset life. While this percentage is still very low, it could inevitably increase if better or richer data was available, or if asset performance improves over time. As shown in Table 8-9, PFI proves to be the more effective procurement option as 20% of the LEP-built PFI schools meet targets for both VfM and environmental sustainability across the full asset life.

8.6 Sensitivity testing

A number of sensitivity tests were performed by setting thresholds from averages in the dataset and comparing these against the contracted KPI Target Level thresholds in Table 8-2. Table 8-10 shows examples for the hard FM costs, soft FM costs and energy costs.

Sample size: 600 LEP-built schools	**Average total hard FM cost (£/m2/yr) – post renewal**	**Average total soft FM cost (£/m2/yr) – post renewal**	**Average total energy cost (£/m2/yr) – post renewal**
Average	£25.3	£21.8	£10.9
Median	£20.3	£18.2	£10.5
Decile 1	£2.0	£5.0	£2.1
Decile 2	£7.2	£8.0	£6.9
Decile 3	£13.1	£11.9	£8.5
Decile 4	£16.9	£15.4	£9.7
Decile 5	£20.3	£18.2	£10.5
Decile 6	£23.9	£21.6	£11.4
Decile 7	£28.4	£25.6	£12.5
Decile 8	£36.7	£30.8	£13.9
Decile 9	£48.4	£40.4	£16.9
Decile 10	£236.6	£168.6	£60.2
Average decile 2 to 9	**£23.6**	**£21.0**	**£11.2**
Contracted thresholds	**£27.7**	**£34.9**	**£12.0**
% sensitivity	**17%**	**66%**	**7%**

	Latest DEC rating logged 2010–2015 post renewal
Average	99
Median	95
A (0–25)	21
B (26–50)	42
C (51–75)	67
D (76–100)	89
E (101–125)	111
F (126–150)	138
G (>150)	172
Average B to F	**97**
Contracted thresholds	**100**
% sensitivity	**4%**

Table 8-10: Sensitivity of operational cost data

Since the first and last decile in Table 8-10 contain outliers, a representative average is taken from deciles 2 to 9. If for the above variables the threshold was changed from the contracted rationalised KPI Target Level to the average (deciles 2 to 9) value in the dataset, then the sensitivity level is very high for soft FM cost, intermediate for hard FM cost, and low for energy cost. Instead of deciles, the standard benchmark categories A to G were used to establish average DEC ratings. The sensitivity levels of DEC ratings are very low at 4%. This might be caused by the large intervals between DEC categories.

In addition, sensitivity levels of other variables were tested by comparing the contracted threshold against the average values in the dataset for capital costs and construction time. Capital costs had to be controlled for by type of education (primary or secondary) and type of investment (new build or refurbishment). Average construction time had to be controlled for by type of education (primary or secondary) and type of investment (new build or refurbishment). A summary of these sensitivity tests along with their considerations is in **Appendix M3**.

8.7 Summary of chapter 8

This chapter commenced with a detailed breakdown of the standard form of KPIs in the BSF policy documents. A selection was made of those KPIs that can resemble rationalised KPI Target Levels for VfM and environmental sustainability at each procurement stage: design, build, maintain and operate. In section 8.3, a large number of asset-level datasets have been called upon and individual variables were identified and translated into whole-life asset value criteria plus two differentiators to categorise the analyses: capital cost (£/m^2) and type of provision. A number of basic relationships were discussed in section 8.4, especially influencing

factors to establish how much of the variability of one asset value criterion can be caused or explained by its relationship to another criterion. The most pronounced example is that of capital cost (£/m^2) versus the floor area of schools, which follows a logarithmic function. In order to control for this relation, there should be separate benchmarks for capital cost of smaller (primary) and bigger (secondary) schools, and location.

Based on the various MCAs and appraisals of data from LEP-built schools against the rationalised KPI Target Levels it was observed that the LEP model has a variable influence to achieve its objectives to deliver long-term VfM and environmentally sustainable education facilities. PFI proves to be the most effective investment option to deliver these objectives across the whole asset life, yielding a net effect ratio of 20% for VfM criteria and environmental sustainability criteria combined, as well as in isolation for the lower capex extended schools. The data also suggests that it is more challenging to achieve KPI Target Levels for environmental sustainability than those for VfM, given the lower average net effect ratios for sustainability.

Having noted that lower capex extended PFI schools perform significantly better across the asset life for both VfM and environmental sustainability criteria, there could be arguments that PFI schools are subject to more detailed and frequent reporting requirements and hence the data mining yielded better-quality results. Notwithstanding that, the argument is based upon schools meeting contracted performance criteria, which PFI assets seem to achieve better. There is still a long way to go for schools to improve the achievement of whole-life asset value criteria for both VfM and environmental sustainability. The 600 LEP-built schools have passed the D&B stages so emphasis needs to go to the M&O stages to improve performance.

These results become useful when focused on organisational learning. That is because organisational learning highlights the programme-level insights into the root cause problems of the BSF policy being delivered, based on an appraisal of the outputs produced over multiple procurement stages.

The LEPs that meet the combined whole-life asset value criteria across each procurement stage for predominantly most of their schools portfolio have been selected for further research in chapter 9. These data analyses support the quest to address the gap in theory that was identified in section 4.10. Detailed analyses of qualitative survey interview data have been conducted on those selected LEPs to find out how the LEP procurement model could be better managed to ensure that contract participants can deliver ongoing VfM and environmental sustainability targets for the duration of the partnership.

Chapter 9 – Results from evaluating the procurement system

9.1 Overview

In this chapter, the results of the organisation-level evaluations of the LEP model are discussed from the perspective of being examples of strategic PPP procurement systems. In the previous chapter, the schools created by LEPs were analysed and assessed on their performance criteria set against the original BSF objectives for renewed and refurbished schools.

The objective of this chapter is to explore how key contract mechanisms are judged by the participants in a strategic partnership procurement system, and to evaluate their collective observations. This exploration shows what it takes to achieve clients' expectations of the whole-life VfM and environmental sustainability criteria agreed on projects.

Results are presented by applying the AVEM. As explained in section 7.7, the AVEM is the proposed conceptual framework for collective learning for this type of procurement. The effectiveness of a LEP creating new or refurbished schools was evaluated by adopting the model. The implementation of the AVEM in turn addresses the gap in theory set out in section 4.10.

QFD was chosen as an analysis tool, as explained in chapter 6 (section 6.8), to extract any critical and collective lessons that can be learned from this procurement system.

In section 9.2 a number of shared observations are discussed about how key LEP participants perceive the performance of the joint venture that was created. Section 9.3 draws a link between the asset value criteria that were selected and subsequently assessed in chapter 8 with the client's key contract performance mechanisms (this was discussed in section 6.6.1) described in **Appendix G1**. Each of these mechanisms is assigned to a part of the AVEM as a conceptual learning framework, in line with Figure 7-12 in section 7.7, and then analysed. The outputs of the asset-level data analyses (how LEP-built schools perform against a set of asset value criteria) discussed in chapter 8 become the inputs for the LEP-level analyses.

Section 9.4 aims to converge on a set of headline projects using the IPD Performance Framework to enable evaluation of the collective learning capabilities of LEPs under various circumstances. The QFD process is applied to analyse LEP-level data and compare these as described and explained in chapter 6 (sections 6.7 and 6.8). Important inputs and outputs of the Asset Value QFD are arranged and classified in section 9.4. Outcomes are presented in section 9.5 in line with the AVEM as a conceptual learning framework. Finally, in section 9.7 the outcome tables along with the AVEM are validated by a workshop of experts that confirmed or rejected the presented outcomes.

9.2 General performance perceptions by participants in LEPs

This section starts with some shared observations of how key contract participants involved in LEPs perceive the performance of their joint venture business as a development and delivery vehicle for social infrastructure, especially schools.

The interview survey questionnaire included general questions (**Appendix K3, section 0**) for key participants involved in operational LEPs, to give rise to the challenge as to how they can measure and manage the performance of their underlying assets effectively. The preliminary results include the overall performance (section 9.2.1) and commercial success of LEPs (section 9.2.2), delivering environmental sustainability (section 9.2.3) and the strength of the partnership in a LEP (section 9.2.4).

9.2.1 Operational performance of LEPs

As explained in chapter 1 and **Appendix C** section 2.6, most of the BSF schools were delivered through LEPs under exclusivity arrangements. Instead of repeated competitive tendering of each project to provide assurance on their VfM, LEPs used a variety of other means to incentivise performance. One of the interview survey questions posed was: *"How much did the threat in the SPA of the LEP losing its exclusivity prevent poor performance on the contract? And why?"* (Questionnaire Q0.13)

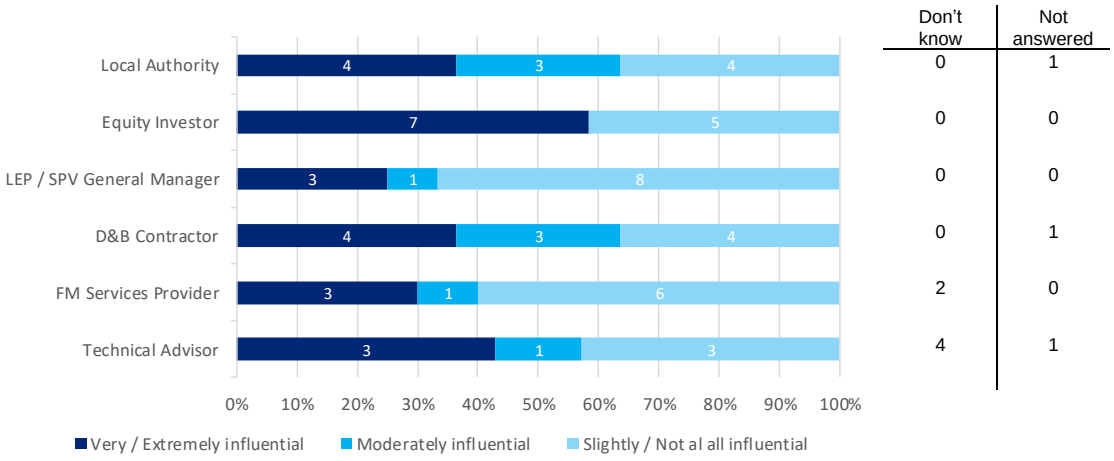


Figure 9-1: Influence of a LEP's threat of losing exclusivity on operational performance

Respondents' answers were given on a five-point ordinal scale from 'not at all influential' to 'extremely influential'. After analysing, the results were summarised on a three-point scale to pronounce them as shown in Figure 9-1. The chart shows a lot of disparity between the different participants across different LEPs. There is a trend that just over 40% (30 of all 72 respondents) believe it was not influential at all, or slightly at most. The main reasons given by the 24 respondents who felt the threat in the SPA of the LEP losing its exclusivity was *'very to extremely influential'* are analysed and presented in Table 9-1.

	Local Authority	Equity Investor	LEP/SPV General Manager	D&B Contractor	FM Services Provider	Technical Advisor	Total
Exclusivity helps strengthen relationships with parties.	0	3	1	2	0	0	6
Exclusivity itself is an incentive to perform well.	0	1	0	1	2	1	5
Exclusivity helps meet client expectations and benefits.	1	2	0	1	0	0	4
Commercial drivers (recover upfront costs, retain work, make turnover).	0	2	0	1	0	1	4
Exclusivity is an investor risk to manage at the LEP board.	0	2	1	1	0	0	4
To evolve as a viable business beyond the exclusivity period.	0	2	1	0	1	0	4

Table 9-1: Reasons why a threat to lose exclusivity is more influential and frequencies

Other less frequently stated reasons why exclusivity can be influential: it offers the option to win new projects (outside OJEU); for reputational reasons; for personal career aspirations; employment security; to encourage effective and efficient LEP management; the threat can also be used by parties to complain.

The main reasons given by the 30 respondents who felt the threat in the SPA of the LEP losing its exclusivity was *'only slightly influential'* or *'not at all influential'* are shown in Table 9-2.

	Local Authority	Equity Investor	LEP/SPV General Manager	D&B Contractor	FM Services Provider	Technical Advisor	Total
Exclusivity helps strengthen relationships with parties.	1	2	0	0	0	2	5
We can meet our targets in the contracted performance regime.	1	0	2	1	1	0	5
It is our corporate aspiration to perform at best ability.	0	0	3	2	0	0	5
No future pipeline aspired, only focused on committed work.	0	1	2	1	1	0	5

Table 9-2: Reasons why a threat to lose exclusivity is less influential and frequencies

Other reasons stated as to why the exclusivity threat was less influential: the fact that BSF was cancelled; LA clients did not really question performance in relation to exclusivity; there is no viable alternative when exclusivity is lost; the constitutional LEP structure as advertised under OJEU may limit potential for extra work; SPA gives LEPs little recourse and poor protection on its contracts. Finally, it can be observed that the Equity Investors seem to be the most concerned about the risk of losing exclusivity. This may be explained by the fact that they bear the commercial risk during development stage and ultimate responsibility for ensuring that contracted requirements are delivered. The principles of exclusivity as discussed in chapter 1 and **Appendix C** section 2.6 were an important aspect of the policy installed. However, based on these preliminary results, it can be argued that its effectiveness is limited. This area will be considered and discussed in chapters 10 and 11.

9.2.2 The commercial success of LEPs

One of the survey questions posed in relation to the commercial success of LEPs was: *"If you would have to mark the overall success of your LEP with a score between 1 and 10, what would it be? And why?"* (Questionnaire Q0.20)

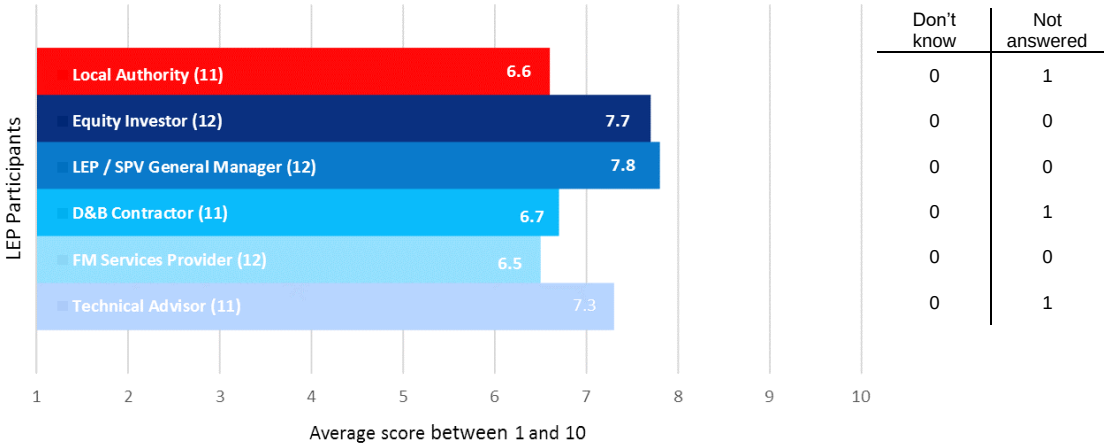


Figure 9-2: Respondents' views about the overall success rate of the LEP model

The Figure 9-2 shows that the LA clients, D&B contractors and FM services providers are more sceptical about the success of the LEP model. In contrast, the Equity Investors, LEP/SPV General Managers and lenders' Technical Advisors have more optimistic views. Reasons for this have been classified as shown in Table 9-3. In this table, reasons for LEPs being more successful than those that are more critical are displayed.

General reasons for the success of LEPs	#	General reasons why LEPs failed	#
LEP exclusivity period			
It successfully delivered the full programme of works originally agreed at Financial Close.	14	Weak potential for extra development pipeline through LEP (during exclusivity period).	5
LEP is delivering extra work or services (in addition to original pipeline).	8	More could be done on developing extra pipeline or services (during exclusivity period).	5
Contract compliance			
Most contract deadlines and obligations are met during various stages in the procurement process.	7	There are significant contract issues outstanding with some LEPs (e.g. programme delays, legal disputes, defects, ICT/FM underperformance).	11
Relationships			
Relationships between public and private sector are good to excellent.	11	Relationships have not been good, or it took a long time to get it right.	6
Client feedback			
Positive feedback from LA client or end users on performance.	11	Negative feedback from client or end users on performance.	2
Local socio-economic needs			
Bespoke schools delivered along with aspects to meet local economic needs at that time.	8	Lack of focus on local socio-economic needs.	1
Financial			
Commercial profit and loss considerations to LEP and its shareholders.	5	Very high bidding costs are not recoverable.	2
LEP-built schools are good VfM.	1	Schools are too expensive.	1
Delegation			
LEP delegates to its supply chain proactively, preventing many long outstanding issues.	5	Some LAs actually want to take control and do less partnering.	2
LEP procurement vehicle			
The LEP as a procurement vehicle is viable and reliable to deliver the objectives set.	4	The LEP as a procurement vehicle is not seen as a reliable or viable route.	3
BSF cancellation			
Incentivised to perform by government threat on austerity measures (BSF cancellation).	1	Impact of BSF cancellation – only part of the programme was delivered.	4
Lessons learned			
LEP did learn lessons and continually improved as time moved on.	2	More focus is needed on lessons learned, continuous improvement and POE.	3
Contribution to personal career development.	1		
Innovation			
Innovation is encouraged.	1	Innovation not encouraged.	1

Table 9-3: General justifications for the overall success or failure of operational LEPs

The observations in Table 9-3 are ranked in order of frequency raised by key LEP participants, so those at the top can be regarded as the most critical factors for success or failure. The frequency order is interesting as it makes it clear that the total number of reasons for success (79) outnumber those for failure (46). Main reasons for success of the LEP model depend on:

(1) A successful project delivery against an agreed programme of works;
(2) Sound relationships between public and private sector partners; and
(3) Positive feedback from LA clients or end users on performance.

Those parties who regard the LEP model as a failure are most concerned about the significant contractual issues outstanding, such as programme delays, legal disputes, defects, or ICT/FM-related underperformance. However, Table 9-3 also lists less frequently stated reasons for success or failure of the LEP model as a business. The impact of the BSF cancellation resulting in only a part of the programme being delivered was not so frequently raised.

9.2.3 Environmental performance of LEPs

One of the survey questions posed to the 72 LEP participants in relation to the environmental performance was: *"How does your LEP measure and manage the environmental sustainability performance of its operational schools?"* (Question Q0.12)

Following analysis, answers to this open-ended question were cascaded into two categories: positive and negative observations, as shown in Table 9-4.

Positive observations	#	Negative observations	#
Energy consumption (meter readings and utility bills) measured monthly or quarterly against a planned profile.	16	Some LAs may not be interested in monitoring and managing ongoing energy consumption levels.	4
Energy performance reports include detailed trend analyses, comparisons against targets and any operational savings.	11	This is not happening at present (the LEP still needs to set up mechanisms to collect and manage energy).	3
On FM and PFI contracts, an 'energy target' or KPI is agreed with a risk/reward mechanism on energy consumption for the private sector.	11	It is proving difficult to reduce energy levels as the LEP is under high pressure to achieve other KPIs, such as delivering VfM for the LA.	2
Advanced technologies (e.g. Building Information Modelling (BIM), Building Management Systems (BMS)) and energy information systems (e.g. Stark, Energy Eye) are used to measure performance.	7		
Energy consumption (meter readings and utility bills) measured for PFI schemes.	7		
Annual KPIs during D&B stage on environmental performance (e.g. surplus energy usage, site waste removals, recycling).	5		
Energy consumption (meter readings and utility bills) measured annually against targets set.	5		
Introduce a learning tool for pupils and staff to use and encourage behavioural change.	4		
FM providers also report on aspects (e.g. waste separation, recycling, energy consumption).	3		
LA and LEP jointly invest in a 'soft landings'-like change programme for schools to raise awareness (e.g. recycling or reducing energy).	3		
Adjust for fluctuation (measure benchmark degree days against the previous year's data).	3		
Some LEPs create an 'Energy Action Group'.	3		

Table 9-4: General observations on how LEPs handle environmental sustainability

Observations as listed in Table 9-4 are ranked in order of frequency raised by the respondents. Those at the top can therefore be regarded as the most common ways of LEPs measuring and managing the environmental sustainability of schools. While a limited number of observations raised by the respondents were negative, the vast majority were positive comments. The most common ways to measure and manage the environmental sustainability performance of operational LEP-built schools are:

(1) Monthly or quarterly measurement of consumption levels (meter readings and utility bills) against a planned profile;
(2) Provide energy performance reports with detailed trend analyses, comparisons against targets and any operational savings; and
(3) FM and PFI contracts have an agreed energy target or KPI with a risk/reward mechanism on utility consumption for the private sector.

Table 9-4 also lists other noteworthy but less frequently stated observations on how LEPs handle environmental sustainability.

9.2.4 The strength of the relationship in LEPs

One of the survey questions posed was: *"How would you rate the overall long-term partnership between public and private sector partners within a LEP? Any why?"* (Questionnaire Q0.18)

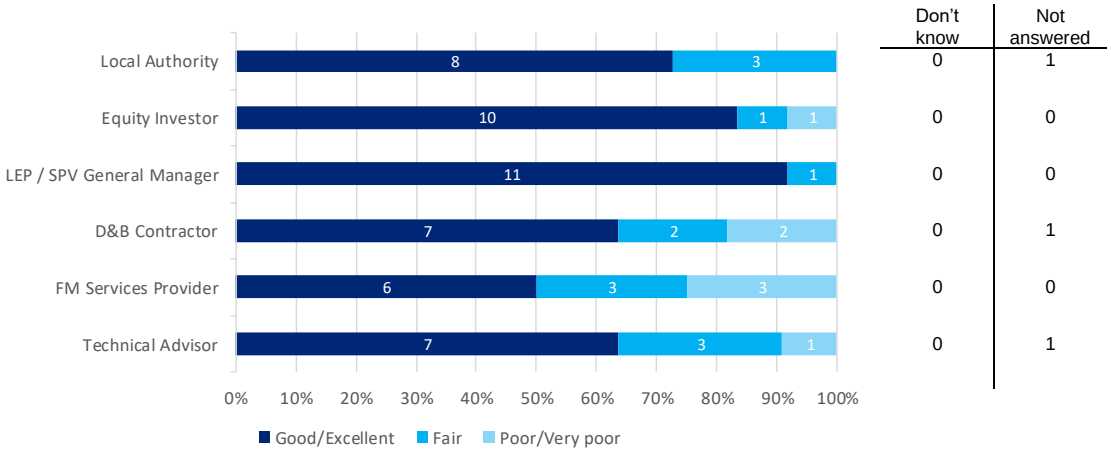


Figure 9-3: Strength of the partnership between public and private in LEPs

The answers from the 72 LEP respondents were given on a five-point ordinal scale from 'very poor' to 'excellent'. Results are shown on a three-point scale in Figure 9-3 to make them more pronounced. There are mixed views, especially with the supply chain partners to the LEP: D&B contractors, FM services providers and Technical Advisors. For each direct LEP participant, some 70% to 90% felt that the overall long-term partnership was good to excellent.

It is clear from the results listed in Table 9-5 that successful long-term PPP relationships in a LEP model can be encouraged when:

(1) Early efforts are put in building strong personal relations between individuals in the partnership; and
(2) Public and private parties see a LEP's potential and long-term benefits as a procurement system.

Drawing from the SPA, there are nine high-level principles which set out the key factors for a successful long-term relationship between partners and underpin the delivery of the parties' obligations (see **Appendix C** section 2.4). These principles could be supplemented with the two observations listed above. Table 9-5, however, also lists out other less frequently stated reasons for positive versus negative PPP relationships within LEPs.

Reasons for positive PPP relationships	#	Reasons for negative PPP relationships	#
By putting early effort into building strong personal relationships between individuals.	10	Because there was not enough drive or constant discipline on both sides to reach full potential.	6
Because both parties see the LEP's procurement potential and long-term benefits.	10	Contract obligations causing issues (e.g. programme, handover, latent defects, disputes).	6
By delivering a programme of works to time, cost and quality constraints.	8	Because there has been personal distrust between public and private sector (a culture of man-marking).	4
Relationship strength can evolve up and down over time but are sustained at a strategic level.	7	Due to resistance from the LA client who wants to take control.	4
Long-term partnership gives workload continuity to both parties for many years (commercial).	6	Because the contract is sometimes seen as an obstacle by the public sector, causing resentment.	4
By spending time on building trust by working together and meeting on a regular basis.	5	Due to inconsistent resource and skills (staff churn) partly caused by the cancellation of BSF.	3
By selecting delivery teams with the right skills who can meet client expectations.	4	When the LEP supply chain takes a traditional approach to partnering, it causes issues with LA.	2
By accepting that there will be challenges and discuss these openly and frankly.	4	The fact that the BSF programme was cancelled caused an overhaul that affected relationships.	2
By listening to the client in order to match their expectations.	3	When the contract is being used as a weapon.	1
By setting delivery criteria and recognising mutual objectives.	3		
Based on feedback received from benchmarks.	2		
By adopting a partnering ethos (cordial communication, sharing information and knowledge).	2		
By active use of contract mechanisms, systems and processes to achieve VfM.	2		

Table 9-5: Reasons for positive versus negative PPP relationships within LEPs

9.3 Linking asset value to organisation performance requirements

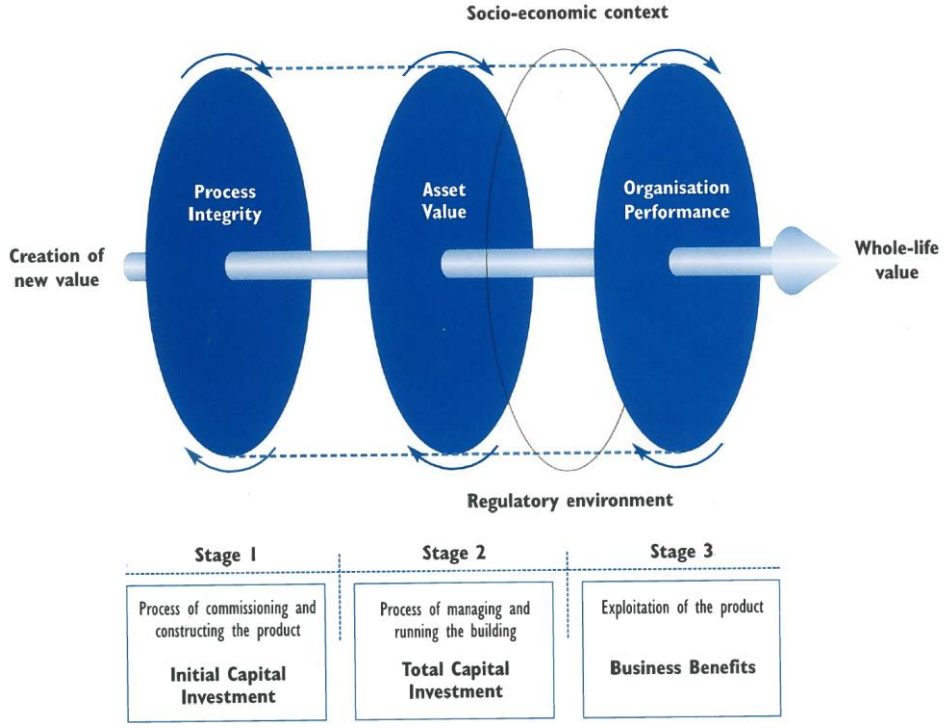
In this section, the author attempts to draw links between whole life asset value criteria of LEP-built schools that were appraised using MCAs, as explained and described in chapter 8, and key supporting policy mechanisms that LEPs have agreed with their LA clients, as discussed in chapter 6, section 6.6.1 (and with reference to **Appendix G1**).

The original BSF policy did attempt to include these links between the asset (the school) and the organisation (the LEP), by recommending integrated forms of contract (DBMO). This raises questions for the public and private sector about both demonstrating the ability of the LEP model to deliver infrastructure and services, and transparency about public and private money invested in this programme. Also, questions can be raised about the practical use and insights of the contractual performance mechanisms introduced to control delivery and their impact on sustainability and VfM to clients. **Given this context, it is important to understand how to measure and manage effectively the performance of a strategic partnership procurement system (the LEP) for social infrastructure.**

The starting point was to look at the notion of whole-life value in infrastructure assets (see section 3.2.4). In legacy BSF policy documents, this was expressed in terms of criteria for VfM

and environmental sustainability (chapter 2) across the procurement stages design, build, maintain and operate. According to Spencer and Winch (2002), analysing the whole-life value generated from a capital investment results in the production of better-quality products that are able to facilitate clients' and end users' needs. The asset is inextricably linked with the business benefits that derive from the creation of the new value. Thus, the contracted LEP policy mechanisms and the underlying asset value criteria for LEP-built schools should be regarded as interdependent. It connects the value of the asset for the client with the business benefits that accrue from the creation of new value. In a PPP structure, these beneficiaries are both public and private sector organisations.

The model developed by Spencer and Winch (2002), as shown in Figure 9-4, presents a three-stage approach to reaping business benefits from an initial capital investment for a client. Stage 1 is origination, design, commissioning and construction, where the client articulates its requirements and ensures effective project management by contracted delivery organisations involved. This stage represents the capital cost to deliver a built asset. Stage 2 concerns the exploitation: the process of maintaining and operating the asset. At this stage, the asset requires sufficient resources to be managed and maintained efficiently. Stage 3 of the cycle enables both the client (a LA) and the organisation (a LEP) to reap the benefits by exploiting the asset (a school). As shown in Figure 9-4, the asset quality is constrained or enabled by the socio-economic context and regulatory environment in which it is produced.



Source: Spencer and Winch (2002, p. 48)

Figure 9-4: Linking asset value with organisation performance requirements

Spencer and Winch (2002) point out that learning during each of the three stages is essential for future cycles of asset creation. The only way in which greater value added can be achieved by clients in the future is through deep understanding of how they use their current assets.

The authors acknowledge that showing substantial evidence to link asset value with organisation performance is a complex and challenging task, and requires research into a number of areas:

- The development of the model (Figure 9-4) to link the asset value with organisation performance requirements could allow clients to take into account the key criteria in investment appraisals, when the product is in construction and in operation. However, there is a need to further develop a robust framework that can aid them in clearly articulating their needs and requirements, and to raise the importance of the value that design development can add to the product in use;
- From the client's perspective, it is sensible to assume that the benefits resulting from value-added investment have to be reaped by the investor. The applicability of the current model (Figure 9-4) could be enhanced by narrowing the cost and value analyses more specifically to particular types of building and different client types;
- The difficulty in processing the tangible and intangible aspects that create the asset value suggests there is a need for further research into more transparent investment appraisal techniques;
- More research is needed into innovative techniques to include whole-life asset value criteria in the property investment decision-making process. The process of investment needs to be linked with the processes and methods of production and maintenance, so that clients can reduce uncertainty surrounding the possibility of procuring a high-quality built asset.

Based on these recommendations and indications, plus those listed by Ibrahim et al. (2010) at the end of section 7.5 in chapter 7, the author proposes applying the AVEM as introduced and discussed in sections 7.6 and 7.7. The AVEM addresses these recommendations by a more thorough evaluation of the whole-life value and benefits offered to organisations involved in a portfolio of social infrastructure assets. Therefore, the focus now is on implementing the AVEM as a conceptual learning framework to help private investors, developers and operators, and public sector clients to recognise the importance of collective learning on the overall asset performance and whole-life value affecting the quality of the output.

Table 9-6 shows 12 key contract performance mechanisms identified under the original BSF policy to measure and manage performance of the LEP procurement system. These mechanisms were previously introduced in chapter 6, section 6.6.1, with a further elemental breakdown in **Appendix G1**.

Stage	Contract performance mechanism	BSF contract reference
PLAN	**1. LEP Company Business Plan**	**SHA, Schedule 3**
	2. Partnering Services Specification	SPA, Schedule 12
	3. Collective Partnership Targets	**SPA, Schedule 14, part 1**
DO	**4. New Projects Approval Procedure**	**SPA, Schedule 3**
	5. Cost Benchmarking Procedure for new projects	**SPA, Schedule 21**
	6. Market Testing Procedure for new projects	SPA, Schedule 4
CHECK	**7. PFI Payment Mechanism & PMS**	**PA Payment Mechanism, Schedule 6**
	8. Non-PFI FM/ICT Payment Mechanism & PMS	**SA Payment Mechanism, Schedule 5**
	9. PFI Benchmarking & Market Testing	*PFI Project Agreement*
ACT	*10. LEP/SPV Board Report & Management Accounts*	*Management Services Agreement*
	11. Key Performance Indicators	**SPA, Schedule 14, part 2**
	12. Continuous Improvement Targets	**SPA, Schedule 15**

Legend: **Bold** = selected for interview survey data analysis.
Regular = selected for interview survey data analysis, but did not deliver enough of a response.
Italic = added after the interview surveys, hence no data could be collected for further research.

Table 9-6: Key LEP contract mechanisms in BSF standard form of contracts

The AVEM is used to allow a systematic way of collective learning from key participants in LEPs. This in turn addresses the gap in theory that was identified in section 4.10. In the analysis of LEPs using the AVEM, as Figure 9-5 shows, it is possible to allocate the contract mechanisms from Table 9-6 to each quadrant in the lower part of the AVEM (in blue).

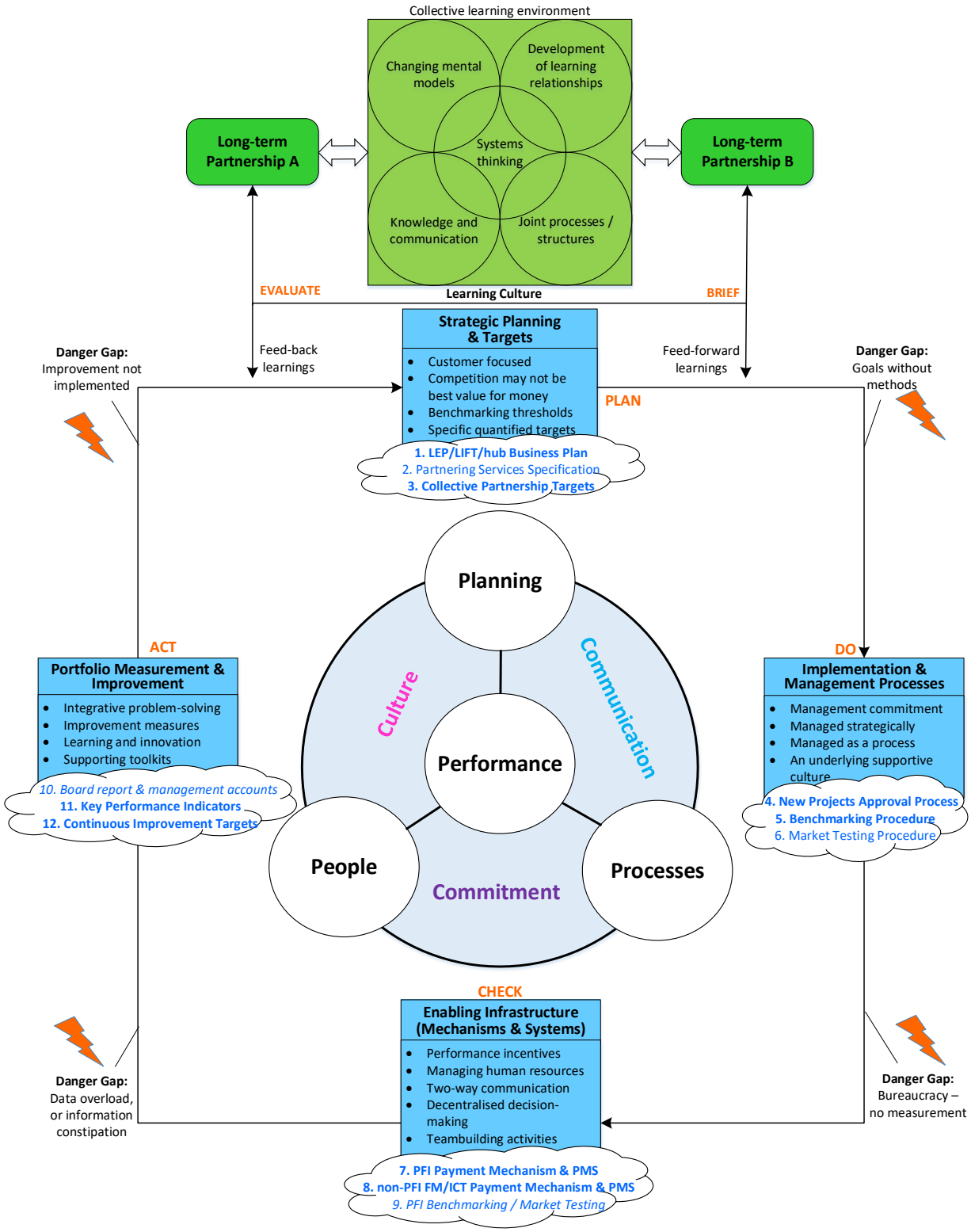


Figure 9-5: Application of the AVEM to LEP contract mechanisms

While three of the 12 selected LEP contract performance mechanisms shown in Table 9-6 can be allocated to each PDCA stage in the lower part of the AVEM, only eight proved to be

suitable for additional investigation. So, consequently, two mechanisms per PDCA quadrant could be analysed in detail. The decision to investigate which mechanisms to analyse was made on 20 November 2012, at a meeting with the then EFA Head of Programme Delivery and EFA Head of Sustainability (both ex-PfS). **Appendix K1** contains the meeting report. The eight mechanisms (**bold** font in Table 9-6) are identified for additional analysis using the AVEM and Asset Value QFD matrix software (see chapter 6 sections 6.8.6, 6.8.7, and **Appendix L**).

Following completion of the LEP survey interviews, it appeared that data collected about the Partnering Services Specification and Market Testing Procedure did not deliver sufficient data to perform statistical analyses (only 26 out of 72, and 11 out of 72 respondents respectively). For the Market Testing Procedure of new projects this is understandable, given that the policy recommends opting for cost benchmarking first, and only if that fails choose to market test. For that reason, most of the LEPs interviewed simply did not apply the Market Testing Procedure, other than on a few occasions. In these instances, market testing was deemed useful for certain work packages that failed to meet the acceptable benchmark range under the Cost Benchmarking Procedure. The Partnering Services Specification delivered more responses from interviewees but frequencies were insufficient for conducting a comparative analysis, as data needed to be broken down by LEP participant to measure collective observations.

One of the interview survey questions posed was: "*Are there any other mechanisms in your suite of BSF contracts that oblige the LEP to perform? If yes, which?"* (Questionnaire Q0.7) Examples of other mechanisms frequently used by LEP participants are shown in Table 9-7.

Contract mechanism	Count
PFI FM Benchmarking and Market Testing Procedure	*6*
LEP/SPV Board Report & Management Accounts	*6*
Relationships protocol	5
Energy mechanism	4
Variation Procedure	4
Contractor Proposals - Authority Requirements	3
Local Authority mandatory audits	2
Local Community Use Agreements	2
Review Design Development	2
Enabling IT infrastructure (e.g. BIM and BMS)	1
Contract Controls Matrix	1
Lifecycle Procedure	1
Soft Landings	1

Total sample = 72
No/Don't know = 31
Not answered = 3

Table 9-7: List of other LEP contract mechanisms

While it is accepted that the above mechanisms are part of the suite of BSF policy documents, from the low frequency count in Table 9-7, it is obvious that many were not used intensively, at least not as frequently as those marked bold in Table 9-6. To cover for the two most frequently counted within the AVEM learning framework, "*PFI Benchmarking / Market Testing procedure*" and "*LEP/SPV Board Report & Management Accounts*" are added in *italic* font to Table 9-6 and displayed on the clouds in Figure 9-5. These two mechanisms were added after the survey interviews were conducted, hence no data could be gathered from respondents.

9.4 Organisation performance parameters

In order to extract critical lessons from LEPs adopting contract performance mechanisms as shown in Table 9-6, different headline categories were set. As discussed in section 3.2, in a PPP/PFI environment, the evaluation of outcomes and benefits should be based on multiple categories measuring against thresholds of affordability and quality agreed at the outset. These categories are adapted from the Global Estate Measurement Code for Occupiers (GEM Code) by MSCI (formerly known as IPD) and work that was historically conducted by the OGC in collaboration with IPD (MSCI, 2013; OGC & IPD, 2010), as shown in Figure 9-6.

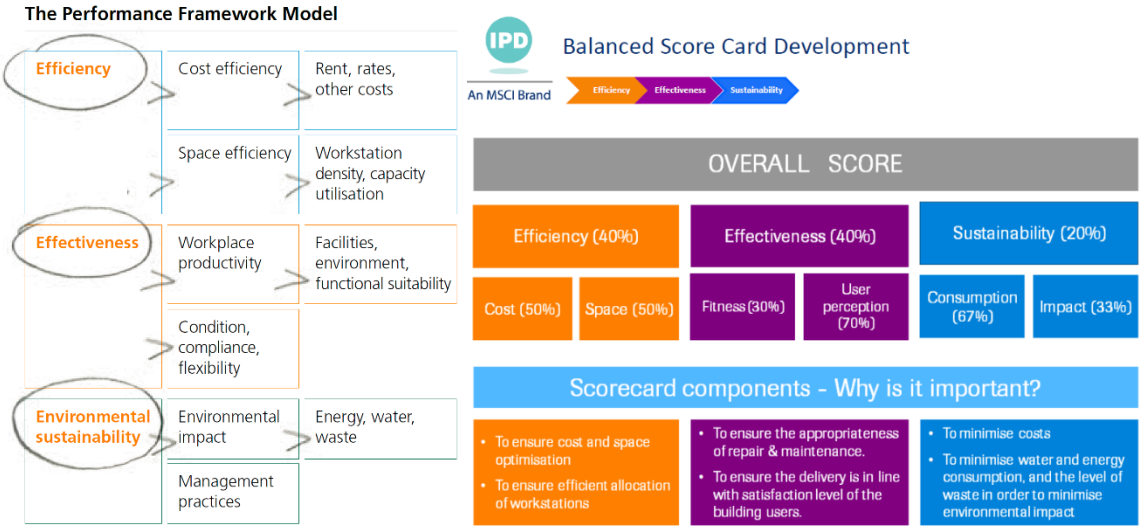


Figure 9-6: IPD Performance Framework Model and example BSC

The IPD Property Benchmarking Service categorises three key components for assessing property performance: efficiency, effectiveness and environmental sustainability. Efficiency metrics are well established and understood but, in parallel, performance-driven organisations must also consider effectiveness of the building. According to IPD, no assessment of building performance is complete without metrics of environmental sustainability performance. In line with the headings of the IPD framework and using the whole-life asset value criteria discussed in section 8.3, it is possible to apportion school-level data to individual LEPs to identify those that succeed or fail. **In this context, it is important to understand how key contract performance requirements established by a client (a LA) and its strategic PPP procurement system (a LEP) can be measured and managed effectively to ensure that whole-life VfM and environmental sustainability targets can be delivered.**

Table 9-8 below shows eight categories, isolating a selection of four better- (shaded blue) versus worse- (shaded purple) performing LEPs across the three IPD Performance Framework components, plus collaboration strength. A fourth category, collaboration, was added to isolate those LEPs that have benefited from cohesive relationships versus those that have adversarial relationships. Table 6-18 shows a full list of 44 LEPs and those 12 identified for further research, representing a fair sample of the LEP market. Those LEPs that were proven to meet a set of asset value criteria for some or predominantly most of their schools (i.e. 7 or more, or >50% of the LEP's portfolio) were selected for further research.

Table 9-8: IPD Performance Framework categorisation of LEPs to asset value criteria

	VfM efficiency	Cost-effectiveness	Env. sustainability	Collaboration
Performance categories	**1.** **LEPs with schools achieving whole-life VfM criteria at a lower capex** All whole-life VfM criteria met at stages DBMO, at lower capex £/m^2	**3.** **LEPs with more cost-effective schools†** Lower capex £/m^2, lower hard FM and energy costs £/m^2/year	**5.** **LEPs with better-achieving schools against environmental sustainability criteria** Environmental sustainability criteria met at Build and Maintain stage	**7.** **LEPs with cohesive relationships** Key partners: LA, EI, GM, DB, FM, TA
Asset value criteria	**- Design Reviews conducted** **- Construction time (months)** **- Hard FM £/m^2/yr ≤ BCIS benchmark** **- Energy £/m^2 ≤ BCIS benchmark** **- Soft FM £/m^2 ≤ BCIS benchmark**	**- Capex £/m^2 ≤ Cabinet Office benchmark** **- Hard FM £/m^2/yr ≤ BCIS benchmark** **- Energy £/m^2 ≤ BCIS benchmark**	**- BREEAM Very Good or higher** **- DEC rating ≤100**	**- Good relationships** **- Excellent relationships**
Selected LEPs	**LEP14 Essex** – 4/8 (50%) **LEP23 Leicester** – 6/22 (27%) **LEP24 Lewisham** – 2/13 (15%) **LEP26 Newcastle** – 3/27 (11%)	**LEP04 Blackburn** – 5/15 (33%) **LEP22 Leeds** – 8/21 (38%) **LEP24 Lewisham** – 6/13 (46%) **LEP26 Newcastle** – 10/27 (37%)	**LEP02 Barnsley** – 10/11 (91%) **LEP07 Bristol** – 8/42 (19%) **LEP22 Leeds** – 6/21 (29%) **LEP23 Leicester** – 6/22 (27%)	**LEP02 Barnsley** **LEP07 Bristol** **LEP26 Newcastle** **LEP34 Sheffield**
Performance categories	**2.** **LEPs with schools achieving whole-life VfM criteria at a higher capex** All whole-life VfM criteria met at stages DBMO, but at a higher capex £/m^2	**4.** **LEPs with less cost-effective schools** Higher capex £/m^2, higher hard FM and energy costs £/m^2/year	**6.** **LEPs with worse-achieving schools against environmental sustainability criteria** Environmental sustainability criteria failed at Build and Maintain stage	**8.** **LEPs with adversarial relationships** Key partners: LA, EI, GM, DB, FM, TA
Asset value criteria	**- Design Reviews conducted** **- Construction time (months)** **- Hard FM £/m^2 ≤ BCIS benchmark** **- Energy £/m^2 ≤ BCIS benchmark** **- Soft FM £/m^2 ≤ BCIS benchmark**	**- Capex £/m^2 > Cabinet Office benchmark** **- Hard FM £/m^2/yr > BCIS benchmark** **- Energy £/m^2/yr > BCIS benchmark**	**- BREEAM rating Good or lower, or unclear** **- DEC rating >100**	**- Poor relationships** **- Very poor relationships**
Selected LEPs	**LEP02 Barnsley** – 5/11 (45%) **LEP04 Blackburn** – 2/15 (13%) **LEP07 Bristol** – 4/42 (10%) **LEP22 Leeds** – 6/21 (29%) *	**LEP02 Barnsley** – 5/11 (45%) **LEP07 Bristol** – 10/42 (24%) ** **LEP27 Newham** – 4/14 (29%) **LEP34 Sheffield** – 5/20 (25%)	**LEP04 Blackburn** – 3/15 (20%) **LEP24 Lewisham** – 4/13 (31%) **LEP26 Newcastle** – 5/27 (19%) *** **LEP37 Southwark** – 3/13 (23%)	**LEP23 Leicester** **LEP24 Lewisham** **LEP33 Sandwell** **LEP37 Southwark**

† Other LEPs include LEP14 (5/8), LEP23 (7/22), and LEP33 (6/16). LEP numbers correspond with those in Table 6-18.

* LEP22 also has three whole-life VfM schools in its portfolio.

** LEP07 also has five more cost-effective schools in its portfolio.

*** LEP26 also has four more sustainable schools in its portfolio.

Four LEPs were identified per category based on a comprehensive appraisal exercise (using pivot tables) of asset value criteria against the KPI Target Levels in Table 8-2. The volume of schools meeting or exceeding a set of asset value criteria against the total portfolio size is shown, with a percentage proportion shown between brackets (e.g. LEP14 Essex – 4/8 (50%)).

In Table 9-8, it can be observed that the percentages shown are 50% or lower, except LEP02 Barnsley in environmental sustainability category 5. While lower percentages should be encouraged for the LEPs in worse-performing categories, small percentages are calculated also in those categories with better-performing LEPs. This implies that LEPs were not always able to deliver asset value criteria set by the government for seven or more schools or more than 50% of their portfolio. The data shown in Table 9-8 was accumulated up to a fixed point in time: September 2015. This table can look different year after year, as new operational data becomes available or the quality of existing data improves. The data flow available in the course of the research study produced the results in Table 9-8 with the limited volumes of LEPs that built schools and met the combined asset value criteria. However, it was necessary to consider the fact that the data received contains missing values and errors. The purpose of Table 9-8 is to isolate those LEPs following crude indications through the asset-level appraisals in which category they would fit best.

Another observation is that some LEPs appear multiple times: Barnsley (4x), Lewisham (4x) and Newcastle (4x). This is acceptable, on the condition that the same LEP does not appear in its opposite category. Three LEPs only appear once: Essex, Newham and Sandwell. The annotated pivot table showing multiple scenarios considered in order to produce Table 9-8 is enclosed in **Appendix N**. A final observation is that the LEPs shown in collaboration categories 7 and 8 were selected following analysis of a survey interview question (Q0.18) as shown in section 9.2.4 and the questionnaire in **Appendix K3**.

The following subsections will set the scene for answering the actual research question 4 using the data sources explored in chapter 6, section 6.7, the QFD methods in section 6.8.6 along with the input assumptions applied to the Asset Value QFD matrix in **Appendix L1**. Section 9.4.1 will turn each of the eight categories in Table 9-8 into projects, to be analysed using QFD. Section 9.4.2 will demonstrate how the Asset Value QFD matrix and software model is populated based on the AVEM conceptual learning framework, with reference to further detail in appendices. Section 9.4.3 sets out what output reports are produced by the Asset Value QFD software, before the actual outcomes of the LEP-level evaluations are presented in section 9.5.

9.4.1 Projects for the Asset Value QFD matrix

The eight categories displayed in Table 9-8 were turned into QFD projects to allow detailed analyses using the Asset Value QFD as an evaluation tool (Figure 6-8 and Figure 6-10). These are identified against four areas of analysis, as shown in Table 9-9.

Area of analysis:	QFD projects:
VfM efficiency	1. LOWER CAPEX LEPs (meeting VfM criteria @ DBMO)
	2. HIGHER CAPEX LEPs (meeting VfM criteria @ DBMO)
Cost-effectiveness	3. MORE COST-EFFECTIVE LEPs (meeting capex & opex criteria)
	4. LESS COST-EFFECTIVE LEPs (failing capex & opex criteria)
Environmental sustainability	5. BETTER ENV. SUSTAINABLE LEPs (meeting BREEAM & DEC criteria)
	6. WORSE ENV. SUSTAINABLE LEPs (failing BREEAM & DEC criteria)
Collaboration	7. COHESIVE LEPs (Good to excellent relationships)
	8. ADVERSARIAL LEPs (Poor to very poor relationships)

Table 9-9: Allocation of LEPs to QFD projects

Each QFD project encapsulates information of four selected LEPs (Table 9-8), with interview survey data from 24 respondents resembling each of the six key LEP participants (refer to research entities in section 6.6.2). Data includes nine survey questions which are identical for each of the contract performance mechanisms in the SPA under investigation as referred to in section 6.7 and the metadata output table in **Appendix J1**.

9.4.2 LEP-level data inputs

This section distinguishes data inputs at elemental level to process data through Room 1 and Room 2 of the Asset Value QFD in Figure 6-8. The technical input assumptions of the Asset Value QFD software and matrix model were summarised in **Appendix L**. Furthermore, the methodological approach to QFD was outlined in section 6.8.6. On the vertical axis, the 'demanded values' (or WHAT elements as shown in Room 1 on p. 165) are listed. These are the responses to interview questions regarding the most challenging contract conditions. For the Partnering Services Specification and Market Testing Procedure, the answers did not deliver sufficient responses, causing a reduction to only eight contract performance mechanisms under evaluation, as Table 9-6 shows. There are a few remarks about the 'value measures' (or HOW elements as shown in Room 2 on p. 165) listed on the horizontal axis:

1) 'Value measures' are defined as the ordinal answering categories to nine semi-structured survey questions for each contract performance mechanism about the way the entities:
   - have spread their *Commitment* to the performance obligations;
   - think about *Communication* of the requirements within the contract mechanism;
   - regard the contract mechanism as an accepted part of its *Culture and behaviour*.

   The three Cs follow the revised TQM framework embedded in the AVEM (Figure 7-12).
2) Questions about the value measures are composed following a formal survey strategy as outlined in section 6.7 and a survey protocol in **Appendix K2**. Questions for each contract mechanism in the questionnaire are apportioned to a PDCA quadrant in the AVEM.

3) There can be responses to the nine questions by some of the research entities to state they may not know the answer or have no opinion. These appear in a separate 'Don't Know' column on the fully populated Asset Value QFD matrices in **Appendix Q**.
4) The questions and their answering categories are in a semi-structured questionnaire provided in **Appendix K3** and an example QFD input table from respondents is in **Appendix L4**. Fully completed QFD input tables are in the **CD appendix**.

9.4.3 Output reports generated from the Asset Value QFD software

The Asset Value QFD software model produces multiple outputs as shown in Rooms 6A, 6B and C6 in Figure 6-8 on p. 165, including the assessment form and complexity assessment reports. These are instrumental for the presentation of results and are discussed further below.

Assessment form

The assessment form (**Appendix O**) shows all answers from four selected LEPs in the order of their complexity high scores. All possible answering categories to questions are included on the form to be able to assess their effect on the key contract mechanisms compared with their benchmark. Therefore, answers are scored considering the strength of their relationship between the common observations/learning points about key contract mechanisms and their conditions' complexity rates. The answers with highest complexity scores are displayed first as these are the most problematic situations, which need more attention so that trade-offs could be made and the conflict resolved. Common observations and recommendations in the assessment form are sorted first for their complexity according to the four selected LEPs (blue marks), and then by the benchmark score of the eight remaining cohort LEPs (purple marks).

Complexity assessment report

Common observations/learning points from four selected LEPs (shown in Table 9-8) are scored taking into account the strength of their relationship to the key contract mechanisms and their conditions' complexity rates. Common observations are listed in descending order of their complexity scores and grouped by those performance conditions that delivered high cumulative complexity scores: rated 'high' or 'very high' with a very strong relationship to the common observations/learning points considered.

These reports (example provided in **Appendix P**) show the decision-making reasoning behind the high score of each relationship that was recorded in the text boxes of the rating form and the relationship matrix, i.e. why a contract mechanism and its conditions within are very complex for the user (score high = 4, very high = 5) and why the relationship between a common observation/action about a contract mechanism and its conditions within is very strong (score strong = 9). Fully completed QFD complexity assessment reports are in the **CD Appendix**.

9.5 Outcomes of the organisation-level evaluations

9.5.1 Introduction

The AVEM was implemented as a conceptual learning framework for collective learning in strategic partnership procurement systems (chapter 7, sections 7.6 and 7.7) and was operationalised at multiple levels in response to research objective 2. Three categories of learning are identified in the case of LEPs:

1) Specific opportunities to learn from those LEP participants that move from project to project (project-based learning);
2) Collective learning points of organisations involved in LEPs (inter-organisational learning); and
3) Considerations from organisations that continue to learn collectively over time (systemic learning).

Specific opportunities to learn

These relate to learning points from LEP participants that move from project to project, often referred to as project-based learning activity (Davies and Brady, 2000). The specific learning points are allocated to each quadrant in the Plan-Do-Check-Act cycle of the AVEM (Figure 9-5 on page 231) as adapted from the continuous improvement model for strategic partnering in construction by Cheng et al. (2004).

On the Asset Value QFD matrix, the elements of a contract mechanism with complexity ratings 'High' or 'Very High' are prioritised. The Asset Value QFD software tool produces output reports with each of the specific learning points identified. A full example report is in **Appendix P**, and all the reports are accessible via the **CD Appendix** with the MS Access QFD software tool. The tables in **Appendix S** display the detailed results, after running output reports of all eight QFD projects for better- versus worse-performing LEPs. The first two columns of the results tables in **Appendix S** show the specific opportunities to learn in better- versus worse-performing LEPs, evaluating two key contract mechanisms for each quadrant of the AVEM. The numbers in brackets behind each observation on the tables are the relevant categories of LEPs in Table 9-8. The main headlines from these tables are summarised in section 9.5.2. The subsections that follow display the headline results to each quadrant in the lower part of the AVEM: Plan-Do-Check-Act, with detailed results tables in **Appendix S**.

Collective learning points

Capturing collective learning points of organisations involved in LEPs fits the paradigm of inter-organisational learning as originally developed by Franco et al. (2004). Shared opinions across a set of four selected LEPs (Table 9-8) needed to be pronounced, hence the input assumptions (refer to section 6.8.6 with detail in **Appendix L1**) are applied. The shared opinion filtered from the ordinal answering categories makes it a collective learning point if, for a selection of four LEPs, three or more participants within the same discipline share the same view.

The Asset Value QFD software tool produces output reports with each of the collective learning points identified. An example report is in **Appendix P**, and all the reports are accessible via the **CD Appendix** with the MS Access QFD software tool, after running the output reports of all eight QFD projects for better- versus worse-performing LEPs. Not every QFD project

delivers collective learning points. The tables in **Appendix S** display detailed results in the last two columns. A red-amber-green colour coding scheme is added to mark positive versus negative collective observations of key LEP participants. Section 9.5.2 displays the headline results for each quadrant in the AVEM, with detailed results tables in **Appendix S**.

Collective learning over time

Considerations from organisations that continue to learn collectively over time fit a paradigm of systemic learning as previously raised by Kupers (2008). Following the lower part of the AVEM on p. 231 and after interpreting the Asset Value QFD complexity assessment reports, it is possible to present key considerations from LEPs that learned collectively over time as their projects progress through the asset life. This will be covered in section 9.5.3.

9.5.2 Specific opportunities to learn and collective learning points

9.5.2.1 Headlines for Strategic Framework & Targets (Plan)

The findings from LEP participants about a Strategic Framework & Targets is enclosed in **Appendix S, Table 1**. There are low levels of collective observations throughout the six LEP participants about the use of a Business Plan and Collective Partnership Targets (CPTs). Collective viewpoints are only apparent between Equity Investors and LEP General Managers. Other LEP participants did not express any strong opinions or observations:

- At lower capex LEPs, only the LAs are actively **involved** in working with the Business Plan during New Project Development (NPD) and at M&O stages together with Equity Investors and LEP General Managers.
- Most investors and LEP General Managers judge that it is **very to extremely important** for them to have a Business Plan in place, regardless of how well the LEP performs, and they **adhere to methods and policies** as described per guidance.
- Individual participants involved in worse-performing LEPs raise more concerns about the Business Plan. Individuals also raise critical observations about CPTs regardless of the performance of LEPs. CPTs are **only somewhat important** to investors and the **accuracy** of the threshold levels is judged as poor to very poor.
- Specific opportunities to learn from Business Plans regardless of the LEPs' performance are:

  Interface between the LEP and LA client. A particular concern pertains to conflict of interest. A high turnover of directors during the life of a LEP combined with LA or D&B contractor representatives also acting as investor is causing changing views or agendas that can create levels of distrust at the LEP board.
  Supply chain management. LEP/PFI General Managers constantly have to ensure that the supply chain performs to keep credibility and reputation of the LEP.

- As for CPTs, due to continued high staff turnover (churn) it is challenging for LEPs to work with authorities and contribute to these targets. Due to the severe austerity measures and a changing political landscape, the contribution required from LAs was very minimal.

9.5.2.2 Headlines for Implementation & Management Processes (Do)

The findings from LEP parties about Implementation & Management Processes from LEPs is enclosed in **Appendix S, Table 2**. High levels of collective viewpoints are observed about the New Project Approval Procedure (NPAP), but much less so for the Cost Benchmarking Procedure. Facilities Managers and Technical Advisors failed to express strong collective opinions or observations. The cost benchmarking exercise occurs during the NPAP process.

- The NPAP requires direct and detailed **involvement** from all participants, at least during the NPD stage. In most cases, LEP General Managers and D&B contractors are actively involved at NPD, apart from those in lower capex LEPs and the less cost-effective LEPs. Equity Investors also get actively involved apart from those in LEPs with cohesive relationships. LA client involvement appears to be stronger on the worse-performing LEPs. The Facilities Managers and Technical Advisors are typically not actively involved at this stage.
- Almost all participants stress the **high to extremely high importance** of having both the NPAP and Cost Benchmarking Procedure in place, regardless of the LEPs' performance.
- Another collective viewpoint is that **some elements were added or modified** to the NPAP in order to suit local conditions. However, participants involved in worse-performing LEPs state that **methods and policies are adhered to** as described per element of the NPAP.
- One alarming collective view pertains to General Managers in LEPs with adversarial relationships, who point out that the NPAP is poor to work with or unachievable. For D&B contractors, it is good to excellent but communicating the NPAP between the LEP and LA is **only fair at best**.
- Working with the Cost Benchmarking Procedure is **only fair at best to achieve results** according to General Managers in LEPs with adversarial relationships.
- Specific opportunities to learn from the NPAP regardless of the performance of LEPs are:

  Preparation of a new project proposal and OBC. Especially investors raise challenges: (1) schools funding allocation is insufficient to meet all the LA requirements; (2) client-led 'requirements creep' between stages 1 and 2 puts pressure on parties; and (3) getting LAs to sign-off new project proposals and VfM assessment.
  New project final approval submission. If a submission is not progressed then the scheme will be at risk for contractors.
  Achieving FC. When nearing FC all issues come to the surface. Many iterations and negotiations create pressure, risks or delays to a LEP's pipeline. To alleviate this, a delegated responsibility of approvals can be introduced.

- Cost benchmarking new projects has been a constant problem. QS firms were involved in demonstrating VfM but often could not give LAs sufficient comfort. Specific opportunities to learn from the Cost Benchmarking Procedure regardless of the LEPs' performance are:

  Substructure. Cost benchmark threshold was high on initial projects so a more realistic level had to be set.
  Abnormal costs. Abnormals can turn out higher due to specific site conditions (greenfield, brownfield, demolishment, or external works). Contractors keep having to justify why costs exist.
  Contractor's preliminaries. Costs put forward are often outside the agreed benchmark range, because prices are only sourced from single suppliers, or due to contractor systems and processes.
  Contingencies, overheads and profits, and inflation. Benchmarking these measures is a constant problem. Much time can be spent on efforts to make savings on relatively small sums of money. Consequently, project proposals are delayed and go outside affordability window for other reasons (e.g. increased RPI and PFI swap rates).

9.5.2.3 Headlines for Enabling Infrastructure (Check)

The findings from LEP participants about mechanisms and systems for Enabling Infrastructure is shown in **Appendix S, Table 3**. Many collective viewpoints are observed about the PFI Payment Mechanism & Performance Measurement System (PMS), and to a lesser extent non-PFI FM/ICT Payment Mechanism & PMS. Cohesive LEPs express particularly low levels of collective observations. This might be explained by the finding that they already have close working relationships between parties leading to less detailed hands-on involvement.

- Both the PFI and non-PFI Payment Mechanisms require involvement during O&M stages, but participants can also be involved in target setting during NPD or Design & Construct (D&C) stage. In most cases, multiple LEP participants are **involved at M&O stage**, except for higher capex LEPs involved in non-PFI FM/ICT Payment Mechanisms where only LAs seem to be concerned, but not the other LEP participants.
- LEP GMs and LA clients seem to be the only participants involved at multiple procurement stages. Long-term involvement appears to have no particular bearing on performance of LEPs as observed in results Table 3 in **Appendix S**: lower capex LEPs, but also less cost-effective and adversarial LEPs.
- Overall levels of involvement are consistently higher for the worse-performing LEPs, as well as the lower capex LEPs. D&B contractors have expressed they are less involved.
- Most participants stress a **high to extremely high importance** of having a PFI Payment Mechanism & PMS in place, regardless of the performance of LEPs. To a lesser extent but still a collective stance is that the non-PFI FM/ICT Payment Mechanism & PMS is very to extremely important, regardless of the performance of LEPs (except for cohesive LEPs).
- The **accuracy** of the PFI Payment Mechanism & PMS to specify the desired process and threshold levels is good to excellent, regardless of the performance of LEPs, albeit Technical Advisors involved in worse environmentally sustainable LEPs say the accuracy is only fair at best. **Accuracy** of the non-PFI FM/ICT Payment Mechanism & PMS is deemed poor to very poor according to LAs, while LEP General Managers and Facilities Managers say it is good to excellent.
- For both better- and worse-performing LEPs, LAs say **communication between the LEP and their supply chain is only fair** for the PFI Payment Mechanism & PMS, while other participants judge it as good to excellent. LAs involved in worse-performing LEPs feel the **communication** about the FM/ICT Payment Mechanism & PMS is only fair at best.
- The collective stance is that elements of the PFI Payment Mechanism & PMS can be **added or modified** in both better- and worse-performing LEPs.
- LAs in LEPs with adversarial relationships express that working with the PFI Payment Mechanism & PMS is **only fair at best to achieve results**, and the **ability to share data** from audits of the FM/ICT Payment Mechanism & PMS is **only fair at best**.
- Specific opportunities to learn from the PFI Payment Mechanism & PMS are:

Helpdesk system. LEPs are still not confident that helpdesk information is accurate as per the contract. This creates a lot of work for the LA that they should not be doing.
Domestic cleaning, waste and pest control. Inconsistent quality of cleanliness (especially internal areas, surfaces, FF&E) on multiple sites are judged by different LAs/school staff. Due to resource restrictions (TUPE-ed staff) FM Co's struggle to attract skilled cleaners and supervisors. If there are issues with cleaning staff then those individuals need to be changed. TAs urge for better training and supervision. It is all about first impressions but all FM Co's struggle to keep cleaning standards and avoid unavailability.
Energy and utilities management. Energy targets continue to be a challenge to meet when consumption levels are trending up, especially if buildings are naturally ventilated. It is hard for FMs to influence end-user behaviour of schools, mainly due to a lack of training and experience by FM staff and school staff. Just training at handover is insufficient to handle complex school energy systems. Also, rising energy tariffs make the utility bills more expensive for schools, which puts pressure on the payment mechanism for FM Co's.

- Similar challenges as with PFIs are observed for the non-PFI FM/ICT Payment Mechanism & PMS on worse-performing LEPs: (1) domestic cleaning, waste and pest control and (2) energy and utilities management. Better-performing LEPs yield no learning opportunities.
- Worse-performing LEPs are deeply critical about the managed ICT services which had many contracts terminated. A reactive performance regime drives a behavioural issue with LAs to only prioritise rectifications with ICT services providers, who then often mitigate against a commercial position. LEPs have signed long-term managed services contracts for a large portfolio but LAs never changed expectations about the service level, even though BSF was cancelled. Better-performing LEPs did not yield specific learning points.

9.5.2.4 Headlines for Portfolio Measurement & Improvement (Act)

The findings from LEP participants about Portfolio Measurement & Improvement is enclosed in **Appendix S, Table 4**. Many collective viewpoints are observed about the Key Performance Indicators (KPIs), and to a lesser extent about the Continuous Improvement Targets (CITs).

- Both KPIs and CITs require active **involvement** during key stages across the asset life: NPD, D&C, M&O, but parties can also be involved in target setting at pre-FC stages. LAs and LEP General Managers are most dominantly involved in KPIs, followed closely by investors.
- There are mixed opinions about the **importance** of KPIs and CITs. Most better-performing LEPs judge having KPIs as very to extremely important, while some participants in worse environmentally sustainable LEPs and those in adversarial relationships judge the KPIs as only somewhat important. A nearly similar pattern of inconsistency applies to CITs.
- There are no collective viewpoints about the **accuracy** of KPIs and CITs as a mechanism. A stance consistently taken by General Managers and Equity Investors is that accuracy is only fair at best, and for KPIs on adversarial LEPs it is even judged as poor to very poor. LAs involved in adversarial LEPs judge the accuracy of CITs as poor to very poor.
- One strong collective viewpoint is that the **communicating KPIs between the LEP and their supply chain** is judged as being good to excellent, regardless of the performance of LEPs.
- There are not many collective views about the **sharing integrity of data**. It is judged as good to excellent for KPIs in the more cost-effective LEPs only.

- There are not many collective viewpoints about the **ability to achieve** KPIs and CITs. A stance often taken by LEP General Managers and Facilities Managers is that KPIs are only fair at best in terms of achievability, which suggests that KPIs are calibrated at stringent levels. One surprising joint view is for the worse environmentally sustainable LEPs who judge KPIs as good to excellent in terms of achievability.
- The consistent stance is that some elements are added or modified to KPIs or CITs by various participants to make it more effective, regardless of the performance of LEPs.
- Specific opportunities to learn from the KPIs regardless of the performance of LEPs are:

  Environmental performance. During construction the KPI for recycling can be challenging. On operational contracts, meeting annual energy utility targets is a constant challenge because it keeps changing. Better understanding is needed of energy use and projected utilisation of buildings before committing to a target.
  Average total cost of construction. Ability to control client-led design scope creep can make it hard to meet the KPI. It can take a long time to demonstrate and there is also an element of LAs not really believing what the private sector reports on. The average cost £/m^2 reduced in the course of the BSF programme so budgets are phenomenally tight in order to demonstrate VfM.
  Predictability of abnormal costs. Abnormals are very hard to predict. It becomes a source of tension between parties due to budget constraints and affordability predictability issues. Some LEPs are sceptical about what they are measuring against when benchmarking is not carried out as accurately as it could be, in particular when the PfS/EFA benchmark data to be used is outdated.
  Customer satisfaction operational phase. This has been difficult for LEPs to achieve due to an expectation gap between the end users who expect a new shiny building every day and the contractual output specifications. Besides, due to the subjective nature of data, there is an element of LA ambiguity about what an FM Co reports upon, along with some financial reasoning.
  Schools community use. A BSF legacy policy that LEPs need to manage: providing training courses, student programmes (traineeships, apprenticeships), community or leisure facilities. It is challenging for LEPs due to a lack of local relations, and schools not pushing it. Schools can sign a 'Community Use Agreement' but due to existing local relations, it is not often pursued while LAs run schools during pre-agreed hours.
  Popularity local schools. A BSF legacy issue that LEPs need to handle but cannot fully influence. LEPs can assist by constructing good-quality buildings but popularity is determined by quality of teaching also.
- Specific opportunities to learn from the CITs regardless of the performance of LEPs are:

  Reduce construction waste. Trends improve as targets become more challenging. Smaller projects are often built on tighter sites, making it hard to treat waste. Contractors should review the handling of waste at design stage. One used brickwork at phase 1 projects and at phase 3 it moved to off-site manufacturing.
  Reductions in average construction costs. LEPs and contractors face extreme challenges to keep delivering a consistent quality of capital projects while continuing to reduce £/m^2. They also have to meet UK legislation with higher demands on asset performance.

9.5.3 Key considerations from collective learning over time

By comparing the complexity assessment high scores for a selection of LEPs in a QFD project with their benchmark high scores at each quadrant of the AVEM (Figure 9-5 on page 231), it is possible to generate insights into what level of collective learning occurs as LEPs progress through each of the PDCA stages. Figures 9-7, 9-8 and 9-9 display multiple results for two QFD projects. Blue bars, dots and lines represent results from LEPs with predominantly lower capex schools achieving whole-life VfM criteria (QFD1). Those coloured purple show results from LEPs with higher capex schools achieving whole-life VfM criteria (QFD2).

1. A clustered bar chart resembles the collectiveness in LEPs, measured by the number of disciplines that share similar views about each of the nine value measures. Frequencies on the bar chart in Figure 9-7 correspond with the illustrative analyses in Room 6B on the Asset Value QFD (Figure 6-8) showing for better- and worse-performing LEPs a level of

collectiveness, articulated by the amount of shared opinion about value measures of individual disciplines. Numbers on the vertical axis range from one to six disciplines, with abbreviations for those involved inside each bar.

LA	Local Authority	DB	Design & Build contractor
EI	Equity Investor	FM	Facilities Management Provider
GM	LEP/SPV General Manager	TA	Lender's Technical Advisor

Collective observations of key LEP participants are shown above each bar in Figure 9-7, split against the three Cs of the AVEM (Commitment, Communication, Culture). Red-amber-green colour coding is added to distinguish any positive versus negative collective observations.

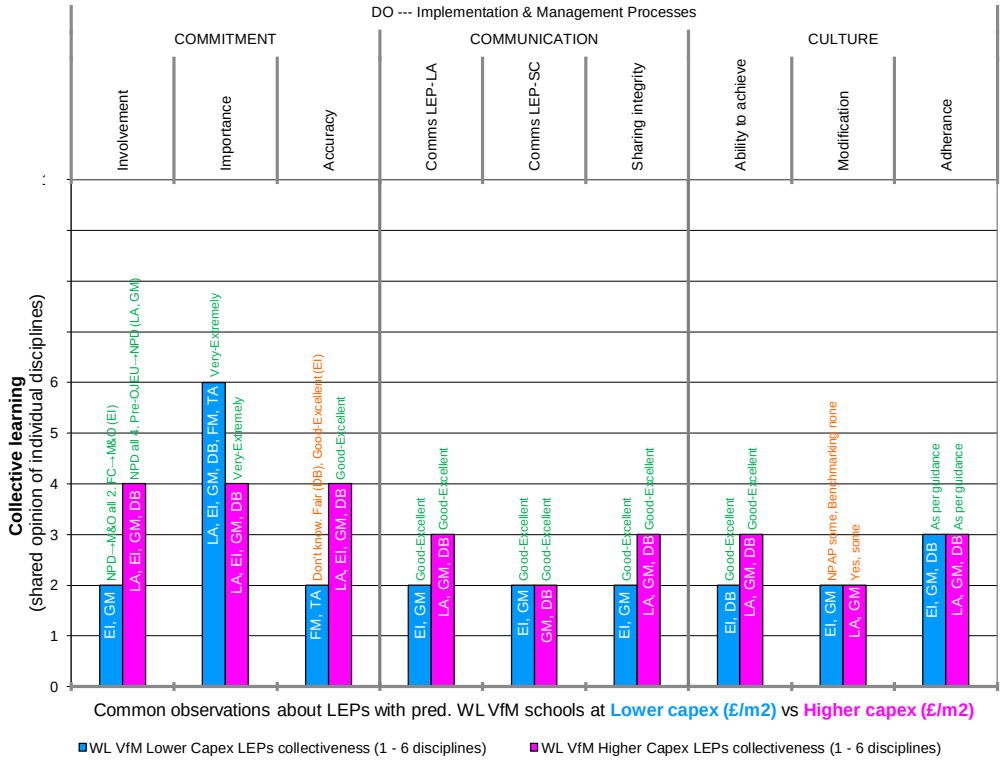


Figure 9-7: Collective learning of selected LEPs vs benchmark cohort

2. A box plot with dots connecting arrows between the complexity assessment high scores show if LEP participants are more or less engaged in learning.

   These plots correspond with the analyses in Room 4 on the Asset Value QFD (chapter 6, Figure 6-8). The dots show for each of the nine value measures a complexity assessment high score for selected LEPs in a QFD project and those of their remaining benchmark LEPs. These high scores can be read using the scale on the right axis on Figure 9-8. Each arrow on the graph connects two dots between the high score from a selection of LEPs (e.g. QFD1) and their benchmark LEPs. For example, the value measure for 'accuracy' shows complexity assessment high scores of the selected LEPs in QFD2 at 216 while their benchmark LEPs accumulate a score of 189. The score of the selected LEPs is higher, hence the arrow goes up.

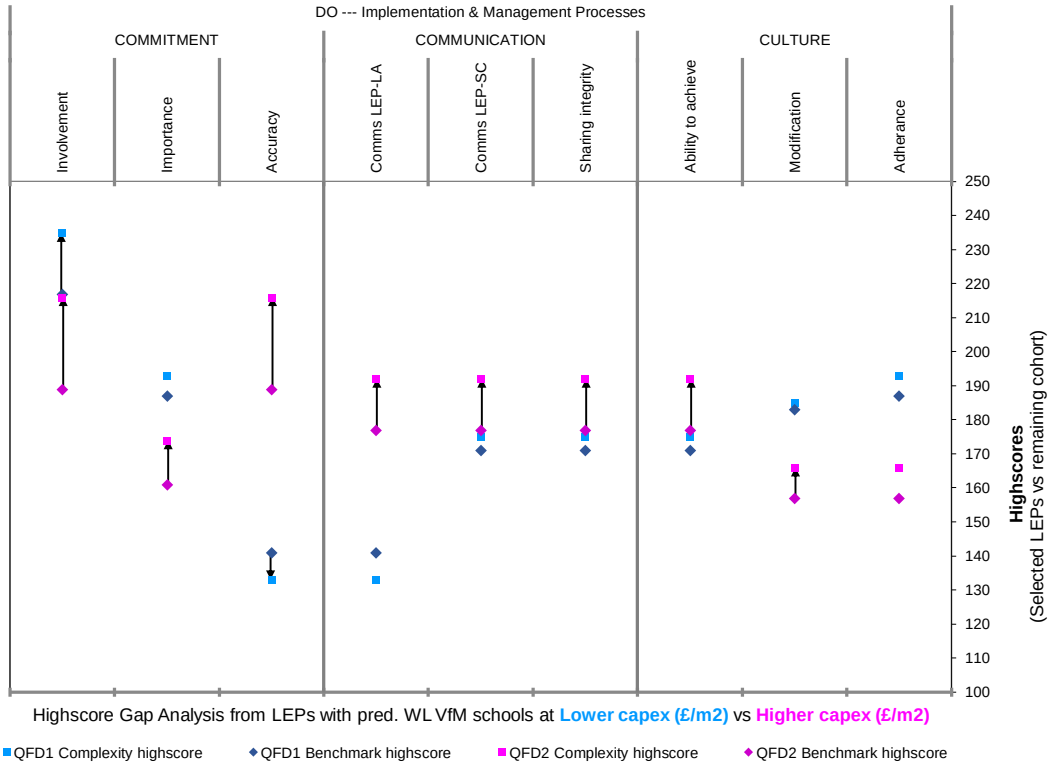


Figure 9-8: Gap analysis of selected LEPs vs benchmark cohort

A tolerance level is introduced to ensure that differences in high scores remain significant. By taking a 5% of the average of all high scores from QFD1 to QFD8 for a value measure, a tolerance <5% means the difference in learning is deemed negligible. Hence, Figure 9-8 shows no arrows for those value measures where the delta between a QFD high score and their QFD benchmark high score is <5% tolerance. This is also shown in the populated Asset Value QFD matrices in **Appendix Q**.

3. A graph with curved lines helps demonstrate if the selected LEPs continue to learn or not. This is based on whether there is a positive or negative difference between complexity assessment high scores against their benchmark LEPs. The plots in Figure 9-9 correspond with the analyses in Room 6A on the Asset Value QFD (Figure 6-8). The complexity assessment high scores of the four selected LEPs can either be:

   "0" meaning in line with the remaining cohort LEPs;
   "1" meaning higher than the remaining cohort LEPs;
   "-1" meaning lower than the remaining cohort LEPs.

   If for a value measure the gap analysis produces "1" (e.g. the LEPs selected in QFD2 judge the accuracy levels of the Implementation and Management Processes at the 'Do'-stage as good to excellent), it means that the assessment high score (216) is significantly more than the high score of the benchmark cohort of LEPs (189), and beyond the 5% tolerance.

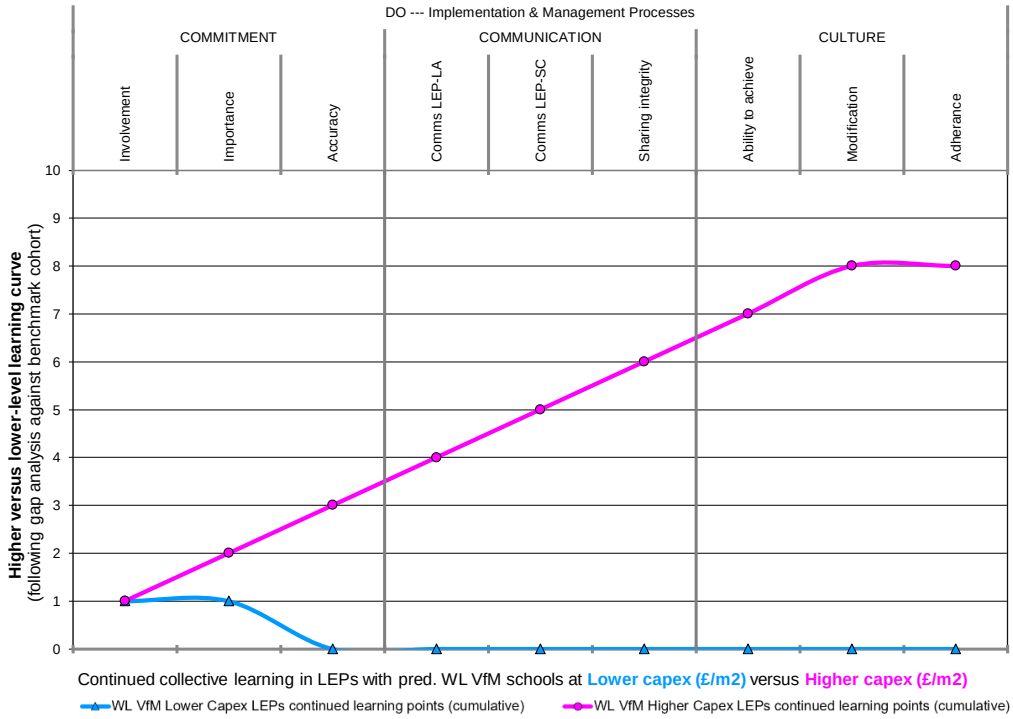


Figure 9-9: Collective learning curve of selected LEPs at 'Do'-stage of the AVEM

The blue (QFD1) and purple (QFD2) curvy lines correspond with the graphs in Room 6B and Room 6C on the template Asset Value QFD (Figure 6-8). The direction of the curved lines in Figure 9-9 follows the position of the arrows in Figure 9-8. The lines may imply that there is a connection between the different value measures. However, this is not the case as each value measure is assessed in isolation. The reason for the connection is the fact that the nine value measures sequentially accumulated at each stage of the Plan-Do-Check-Act process make it possible to draw a collective learning curve. It was discussed in section 3.5 how the learning curve effect encourages the organisations and individuals involved in strategic partnerships to gradually improve and perform better in the absence of competitive forces in the supply chain. Each value measure becomes a pivot point to evaluate if the participants in the selected LEPs have collectively learned more (+1), less (-1) or the same (0) from their observations in comparison to the remaining benchmark cohort.

Figure 9-7, Figure 9-8 and Figure 9-9 display an example at 'Do'-stage for QFD1 and QFD2. After interpreting the Asset Value QFD complexity assessment and benchmark reports for the other quadrants of the AVEM (Plan, Check and Act), Figure 9-10 presents how participants in lower vs higher capex LEPs learned collectively over time as their projects progressed through the asset life. Blue bars and a curved line represent LEPs achieving whole-life VfM asset value criteria at a lower capex (£/m^2), and the purple bars and line represent LEPs delivering similar outputs but at a higher capex. **Appendix R** shows fully worked examples of collective learning curves after plotting the results of the four Asset Value QFD matrices over time, connecting all the PDCA stages in the lower part of the AVEM learning framework.

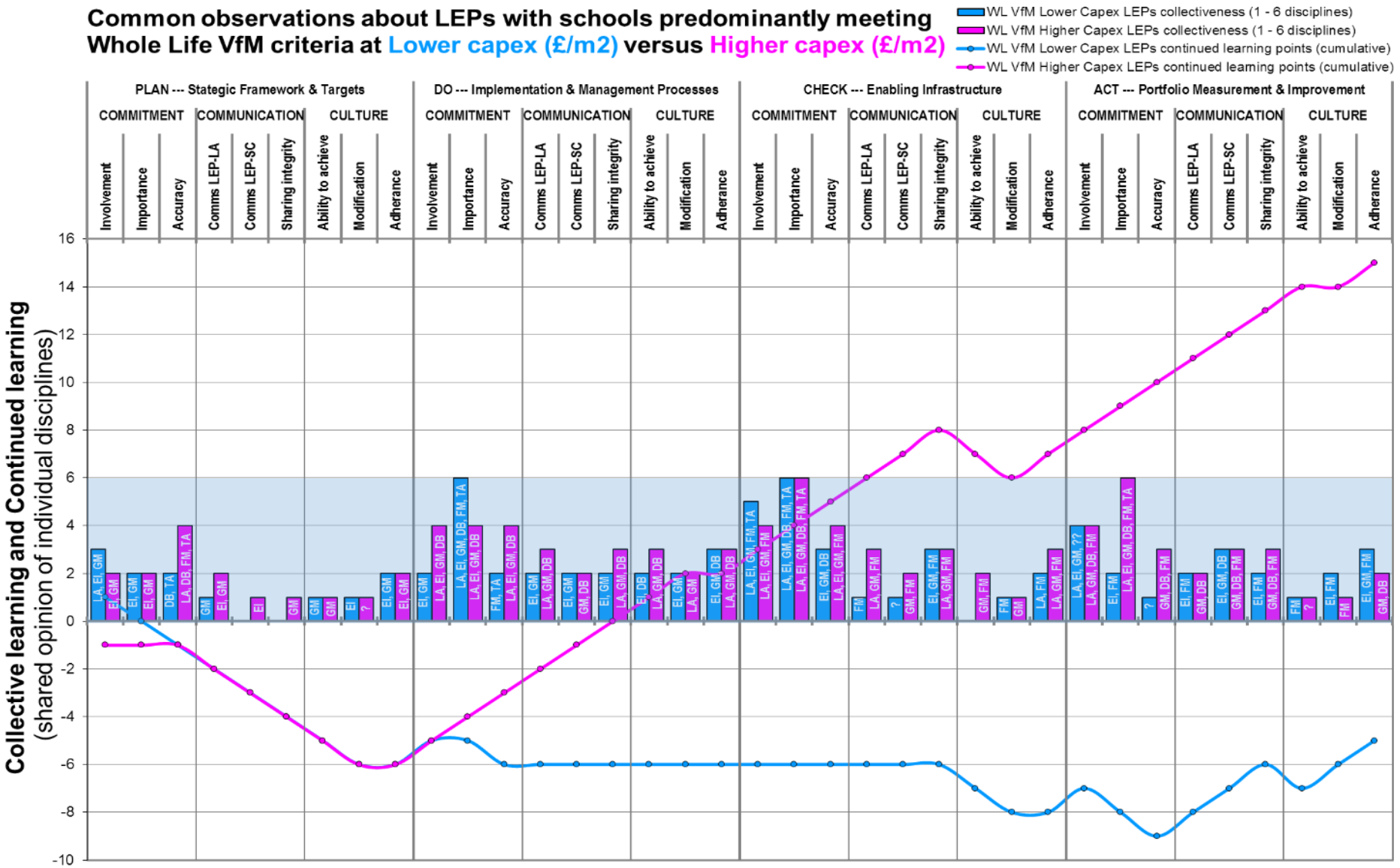


Figure 9-10: Collective learning over time (lower vs higher capex LEPs)

The level of collectiveness is solely affected by the ability of a discipline (e.g. D&B Contractor) involved in a LEP to form a shared opinion about a value measure (e.g. a question about the importance of KPIs) to match that of another discipline (e.g. LA). The more disciplines share the same opinion, the more collective learning can be observed. For each of the nine value measures, there is an assessment report, gap analysis and graph from the Asset Value QFD. They have been combined into one graph along with their respective data tables for all eight QFD projects in **Appendix Q**. In the appendix there are four fully populated Asset Value QFD matrices displaying two QFD projects for each area of analysis: (1) VfM efficiency, (2) cost-effectiveness, (3) environmental sustainability, (4) collaboration. When applying the Asset Value QFD matrix to each category (Table 9-8), four selected LEPs were benchmarked against a cohort of eight remaining benchmark LEPs. These eight LEPs are representative as an average for the rest of the market. By excluding the four selected LEPs as part of the benchmark group, any outputs from the Asset Value QFD become more pronounced (learning points from four selected LEPs are filtered from the total sample of 12 LEPs). If those selected LEPs were included in the benchmark cohort, then those four would be compared against all 12 LEPs, so including themselves, which in turn could blur the output results.

Each of the four Asset Value QFD matrices follow the methodological approach discussed in section 6.8.6 and **Appendix L**. They show the result of eight assessments, with their respective collective learning curves for each PDCA stage in the AVEM learning framework. The graphs in **Appendix R** show how the curve from the four Asset Value QFD matrices progresses over time when all the PDCA stages in the lower part of the AVEM learning framework are connected. This analysis can be summarised in a collective learning curve. The results of these graphs and output tables are further discussed below with reference to **Appendix T**. If complexity high scores of four selected LEPs exceed the high scores of the eight remaining benchmark LEPs (representative for the rest of the market), then more learning is identified. Conversely, if high scores are lower, it means that the benchmark LEPs have learned more. How this principle works was explained on page 244. The collective learning curve always starts at 0, and then accumulates as it progresses through the four stages (Plan-Do-Check-Act) of the AVEM, using each of the nine value measures as a pivot point, so 36 (4 x 9) pivot points in total. If a complexity assessment high score exceeds the benchmark high score then the gap analysis will display a 1, if lower a -1 or if equal a 0. If the curve continues to rise across the nine value measures around the TQM pillars (Commitment, Communication and Culture), it means more collective learning is identified and the gap analyses displays a 1. The line will go down (-1) or stay horizontal (0) if for value measures less learning or similar learning is identified respectively. This can be seen in the illustrative example in Figure 6-8 and the fully populated Asset Value QFD matrices in **Appendix Q**.

The tables in **Appendix T** should be read in conjunction with the curved lines above. Dotted circles on the graphs identify those value measures where critical collective learning points were observed from the selected LEPs. Only for these, the table underneath articulates the collective observations made clustered by TQM pillars: Commitment, Communication, Culture.

9.6 Critical collective learning points and observations from LEPs

This section extracts from the four tables in **Appendix T** that capture collective learning over time any recurring observations made by LEP participants, regardless of whether LEPs are performing better or worse in terms of: (1) whole-life VfM efficiency, (2) cost-effectiveness, (3) environmental sustainability, or (4) collaboration. The purpose of understanding what it is that LEPs have learned regardless of their inherent performance is to bring together all the information from experiences and structure these into a more abstract form with the AVEM. This allows policymakers and practitioners to support their decisions, to predict what might happen next, and to understand the connections about the experiences seen from other LEPs.

Using the AVEM (Figure 9-5), results are structured as follows: Strategic Planning & Targets (Plan); Implementation & Management Processes (Do); Enabling Infrastructure for mechanisms & systems (Check); and, Portfolio Measurement & Improvement (Act). Common observations are shown in Table 9-10 for Implementation and Management Processes (Do), along with a list of collective learning points, prioritised by their frequencies and structured around the TQM framework embedded in the AVEM. Tables are produced for all stages (Plan-Do-Check-Act) and enclosed in **Appendix U1**.

The collective learning points below are universal in that they are sourced from all eight categories of Table 9-8. However, where this was not the case a note is displayed stating 'no collective observations' or 'no collective learning points'. If there are strong viewpoints by a single discipline opposing the collective viewpoint, or if the viewpoint is shared by one or two disciplines only, then this is shown with an asterisk (*) with clarification at the bottom.

DO → Implementation & Management Processes

COMMITTING to the New Project Approval Procedure	COMMITTING to the Cost Benchmarking Procedure
Involvement → at New Project Development	**Involvement → at New Project Development**
1. An intensive process that engages all parties involved to achieve VfM projects; 2. NPAP is robust and clear: planned, staged, time bound with a fixed set of deliverables; 3. High volumes of information required for LEPs to supply to LAs (Local Authorities) during both NPAP stages; 4. Budget flexibility means more iterations of bid proposal submissions, LA/EFA approvals and timescales; 5. Absence of competitive tender means LAs focus on cost savings and interrogation is cumbersome.	1. Cost benchmarking can deliver confidence that LAs get VfM, and a level of commercial control / cost certainty for investors; 2. Difficult exercise requires deep investigation especially towards Financial Close as LAs expect VfM; 3. Insist on quotes of work packages if benchmark thresholds exceed, cost elements are subjective, or data is lacking; 4. If it fails LAs can always negotiate with schools, opt to market test, or procure outside the LEP.
Importance → NPAP is Very to Extremely Important	**Importance → Cost Benchmarking is Very to Extremely Important**
1. With NPAP, LAs and end-users can review proposals timely while LEPs can respond quickly; 2. NPAP encourages enhanced governance, joint working, and stakeholder engagement; 3. LAs measure VfM by due diligence and gateway reviews at each NPAP stage;	1. VfM can only be proved to like-for-like elements; 2. On non-standard items (e.g. abnormal costs) LAs may try to use it to suit, not consistently. Abnormal cost need to be stripped and due diligence needed on the rest; 3. Procedure encourages LEPs to aim to maximise VfM out of an allocated Target Cost, not to make real savings;
Accuracy → Good to excellent	**Accuracy → Good to excellent***
1. Design gateways and freezing the design take time and effort and do not necessarily add to the quality of the end product. It was a lesson learnt not to revise the design many times which was an important learning point. Involving too many people in the design process and continued involvement of schools, too much involvement needs to be limited.	1. LEPs need better skills to interpret cost data, especially for non-standard items, especially lifecycle; 2. Changing LA representatives or headteachers affects a consistent accuracy to assessing cost benchmarking. 3. On early PFI projects there was no data available, and if non-PFI (e.g. refurbishments) there were no data at all. * D&B contractors in lower capex LEPs felt accuracy is only fair at best.

COMMUNICATING the New Project Approval Procedure	COMMUNICATING the Cost Benchmarking Procedure
LEP & Local Authority → Good to excellent communication*	**LEP & Local Authority → Good to excellent communication**
1. Introducing extra LA approval points can reduce their resource commitment; 2. Co-located LEP-LA teams can accelerate the process; 3. NPAP makes it clear what is required with risks identified; 4. A responsibility matrix helps to avoid miscommunication; 5. Too much third party influence in NPAP should be avoided. * D&B Contractors in adversarial LEPs felt it is only fair at best.	1. It encourages a level playing field for both parties involved; 2. It drives value engineering processes to stay within LA budget, although not everyone may like the result; 3. LAs don't often exchange cost data with LEPs, and if so then only in anonymised form; 4. LEPs don't receive EFA feedback restricting them to compare costs to market;
LEP & Supply Chain → Good to excellent communication	**LEP & Supply Chain → Good to excellent communication**
1. NPAP ensures that projects go rarely back for revision; 2. Risks increase if staff involved change halfway through; 3. LAs only share gateway reviews as appropriate; 4. D&B staff actively pass project knowledge onto the next; 5. NPAP allows for third parties to raise questions.	1. Open book approach incentivises supply chains, as LAs can interrogate 4-5 times until approval; 2. LAs have the ability to interrogate supply chains directly; 3. D&B contractors don't often receive requested feedback; 4. Terminology in the standard procedure can be confusing.
Integrity (sharing audits results) → Good to excellent	**Sharing integrity (audits) → Good to excellent**
1. Review results are shared between LEP partners only, not with the supply chains; 2. Hold lessons learnt sessions, internal gateway or due diligence reviews prior to LA approvals; 3. At NPAP Stage 2, GMs can act as gatekeeper involving a full supply chain and specialists; 4. Per project there may be up to 9 formal reviews at three intervals by: LA, LEP/SPV Board, lenders TA.	1. TAs are jointly appointed by the LEP and LA, and complete an influential review; 2. Sharing of cost data in general has been a constant problem. Even QS firms involved to demonstrate VfM often could not give sufficient comfort to LAs; 3. LEPs share cost data with EFA for auditing; 4. Proposals submitted are subject to LA, LEP Board consent and gateway reviews.

CULTURE towards the New Project Approval Procedure	CULTURE towards the Cost Benchmarking Procedure
Ability to achieve → Good to excellent*	**Ability to achieve → Good to excellent***
1. Once optimised it does deliver projects faster, though NPAPs hardly any reached the optimised phase. 2. LAs do meet affordability targets (make savings on fees, or combine multiple schools into one project); 3. Increased confidence with defined deliverables list and clear responsibilities are valued by all; 4. NPAP is lengthy and inefficient for projects <£2m capex; 5. LEPs prepare bids with funding not guaranteed until Secretary of State approves the budget. * GMs in adversarial LEPs felt it is poor to unachievable.	1. It works at New Build D&B or PFI projects, and certain other elements: e.g. LEP PM fees, design fees or insurance costs; 2. It fails on Refurbishments, or primary school New Builds because it is hard to get benchmark data. Those projects are never the same, you compare 'apples and pears'; 3. Benchmarking reports and TA reports lack detail for LAs to interrogate and assess VfM of bids; 4. More and better joint LEP-LA due diligence is needed when LAs do not have the capacity to do it; 5. Some LAs appoint a QS to attempt to get better comfort. * LEP/SPV General Managers in adversarial LEPs felt it is only fair to achieve.
Modifications → Some elements of the NPAP are modified	**Modifications → Some elements of the procedure are modified***
1. Standard NPAP lacks: extra 'Stage 0' or a Pre-Stage 1 report, 'Feasibility' and 'Options Appraisal' for projects post-BSF era; 2. NPAPs are simplified: approval times cut to 2 weeks, shorter deliverables list, or Single Stage NPAP for small capital works; 3. Lenders TAs review the NPAP deliverables list for PFIs only; 4. LA Due Diligence reviews are at end of NPAP Stage 1 and 2.	1. Reset benchmark thresholds to, say: ≤£2m, >£2m to ≤£20m, >£20m capex, or a 3% saving on Target Cost; 2. A consistent iterative process is primarily focussed on meeting the summary benchmarks for 'Total Construction Cost'; * No modifications were made according to LEP GMs.
Method / Policy adherence → As per NPAP guidance	**Method / Policy adherence → As per benchmarking guidance**
1. NPAPs can be tailored to local needs and evolve over time. Once agreed, the NPAP is adhered to by all parties. 2. LAs insist on LEPs to map out and simplify the NPAP to avoid too much resource on checking; 3. The high frequency of submissions can be challenging. Less gateways / stages can speed up NPAP; 4. Use a template that can feed in NPAP Stage 1&2 deliverables; 5. Budget cuts makes teams more pragmatic about NPAP.	1. LAs don't always compare like-for-like; 2. LEPs and LAs can get embroiled in the detail; 3. Up to 5% betterment can be achieved with a QS involved and clear method statements; 4. Especially refurbishments and mixed projects should have cost itemised at elemental level and benchmarked separately.

Table 9-10: Critical collective observations from LEPs at 'Do'-stage using AVEM

The tables with collective observations and learning points in **Appendix U** were presented on 12 separate cards (3 TQM pillars x 4 PDCA stages) at an expert workshop on 23 March 2016. The 12 cards were discussed and validated and subsequently updated based on the feedback received during the workshop. The aims, process and outputs of the workshop are summarised in the next section 9.7.

9.7 Industrial validation workshop

The AVEM applied to LEPs (Figure 9-5) and its results tables with critical collective learning points and observations in section 9.6 and **Appendix U1** were validated during an expert workshop at UCL on 23 March 2016. Sixteen experts attended the workshop representing four distinct groups: policymakers, supply industry, PPP investors, and academia.

The workshop pack in **Appendix V** includes: (1) invitation email; (2) workshop instructions; (3) research summary profile; (4) agenda; (5) participant list; (6) presentation slides and (7) minutes from the Questions & Answers session that followed the workshop.

The aim of the workshop was to validate the results generated from the detailed qualitative LEP-level data analysis, using the AVEM as a conceptual learning framework and the Asset Value QFD matrix as a research tool. Any recurring collective learning points observed by LEP participants that were extracted were presented on cards, along with a list of common observations (section 9.6). The points on these cards needed to be discussed by the group of experts to:

1) validate (do they agree with the collective learning points and observations generated?);
2) prioritise (do they agree with the order of the listed points?); and
3) seek ideas (are there any other critical points that should go on the list?).

Workshop participants were split equally in four groups with a representative from each industry: academic, industry, investor, policymaker. Each group was assigned a quadrant of the AVEM:

Plan → Strategic Planning and Targets;
Do → Implementation and Management Processes;
Check → Enabling Infrastructure;
Act → Portfolio Measurement and Improvement.

At each group, the UCL academic took notes of the discussions. Using the feedback received, the cards were updated and a marked-up version highlighting the changes is in **Appendix U2**.

Following the group sessions, there was a central discussion about each of the quadrants of the AVEM. The expert group felt that the AVEM attempts to explain something complex (strategic PPP procurement systems) in a conceptual framework that is easy to understand. The minutes (**Appendix V7**) include some further constructive feedback received about the AVEM. It also contains a great number of negative comments about BSF due to the fact that the policy was cancelled as a capital programme.

9.8 Summary of chapter 9

This chapter commenced with general results about the perceived performance of key LEP participants regarding the joint venture business: operationally, commercially, environmentally and in terms of relationships. Operationally, most LEP investors perceive the threat of losing exclusivity as very to extremely influential, while LEP General Managers perceive such a threat as being less influential. A LEP's commercial success or failure has been proven to be attributable to many factors (Table 9-3); however, LA clients, D&B contractors and FM providers appear to be more sceptical about LEPs. Equity Investors, LEP General Managers and lenders' Technical Advisors are more optimistic. Results regarding 'ways to deliver environmental sustainability with LEPs and 'the strength of the partnership' show that: (1) early efforts are needed to building strong personal relationships between LEP participants, and (2) both public and private parties should see the LEP's potential and long-term benefits as a procurement system.

Section 9.3 drew links between whole-life asset value criteria of LEP-built schools that were appraised in chapter 8 using MCAs, and key supporting contract mechanisms that LEPs committed to with their public clients. The AVEM addresses these links, and follows up recommendations by scholars for a more all-encompassing evaluation of the whole-life value and benefits offered to organisations involved in a portfolio of infrastructure assets. Twelve standard LEP contract mechanisms were identified and eight of which analysed in detail, by allocating these mechanisms to each PDCA stage in the lower part of the AVEM. In section 9.4, different headline categories were set in line with the IPD Performance Framework Model to allow an evaluation of the learning from LEPs under various circumstances. Table 9-8 showed eight categories, isolating better- versus worse-performing LEPs across the three IPD Performance Framework components: efficiency, effectiveness and environmental sustainability. Collaboration strength was added as a fourth component. The eight categories were turned into QFD projects (Table 9-9) to extract collective learning in response to research objective 2.

Each QFD project encapsulated information of four selected LEPs (Table 9-8), with interview survey data from 24 respondents resembling each of the six key LEP participants. The data included nine survey questions (value measures) which were identical for each of the contract performance mechanisms and structured around the three TQM pillars on the AVEM (Commitment, Communication and Culture). Section 9.4.2 developed the LEP- and asset-level input data for the Asset Value QFD.

The Asset Value QFD software tool delivered prioritised insights into collective observations of key participants involved in LEPs, associated with complexities they face to meet contracted quality expectations agreed with the public client. Having such a tool enables systematic capture of collective observations and learning points from key LEP participants about

standard contract mechanisms in place to deliver projects at multiple stages of their lifecycle. This may reveal any complexities in the delivery of contracted performance criteria for long-term VfM and environmental sustainability. Using the Asset Value QFD as a tool, it is possible to identify three categories of findings:

1) Specific opportunities to learn from those LEP participants that move from project to project (project-based learning);
2) Collective learning points from organisations involved in LEPs (inter-organisational learning); and
3) Considerations from organisations that continue to learn collectively over time (systemic learning).

The results of analysis using the Asset Value QFD software and matrix model are presented in sections 9.5.2 and 9.5.3. Figure 9-10 presents any collective learning observed over time. Clustered bars resemble collective learning measured by the number of individual LEP disciplines that share similar views about each of the nine value measures. Collective learning curves demonstrate whether the selected LEPs continue to learn over time. The collective learning curve starts at 0, and then accumulates as it progresses through the four Plan-Do-Check-Act stages of the AVEM, using each of the nine value measures as a pivot point, so 36 (4 x 9) pivot points in total. If the line continues to rise across the nine value measures for Commitment, Communication and Culture it means more learning is identified. The line drops or stays horizontal if for a value measure less learning or similar learning is identified respectively.

The critical results tables in section 9.6 were validated at an industrial expert workshop on 23 March 2016. The constructive feedback from this session was covered in section 9.7 and the recommendations have been updated on the results tables. The group felt that the AVEM is less complex to understand and appreciated its purpose when applied in a facilitated workshop environment.

The significance of collective learning at individual project stages, from project to project, and over time as projects progress through their asset life in line with the upper part of the AVEM will set the scene for the discussions formed in the following chapter. The conclusions formed in chapter 11 will also focus on the upper part of the AVEM: the embedding of systems thinking; changing mental models; joint processes and structures; developing learning relationships; and the relevance of knowledge and communication.

Chapter 10 – Discussion

10.1 Overview

This chapter examines specific issues around learning in complex strategic PPP procurement systems through investigating the LEP model as used in England's Building Schools for the Future (BSF) programme, by responding to the five research questions developed in chapters 2 to 4. Section 10.2 discusses and considers existing theories of organisational learning and collective learning, and conceptualises the Asset Value Enhancement Model as a proposed learning framework (AVEM) to capture and summarise how collective learning can influence performance in a complex and strategic PPP procurement system. It then contextualises the AVEM learning framework to evaluate collective learning in LEPs. Section 10.3 goes on to examine the results from schools built by LEPs following an appraisal of asset value criteria at individual procurement stages and across the asset life for VfM and environmental sustainability separately (10.3.1) and combined (10.3.2). Section 10.4 explores the importance of first appraising and analysing the performance of the underlying projects based on a set of agreed whole-life asset value criteria in order to effectively measure and manage performance of a strategic PPP procurement system. This is operationalised in section 10.4.2, which implements the AVEM on LEPs and identifies specific opportunities to learn from those LEP participants that move from project to project (project-based learning), collective learning from organisations involved in and between LEPs (intra- and inter-organisational learning), and considerations from parties that continue to learn collectively over time (systemic learning). Finally, section 10.5 provides a summary of the main findings.

10.2 Discussion on the conceptual learning framework

The relative novelty and therefore consequential observed general lack of clarity about how the quality of strategic PPP procurement systems affects the long-term performance of its assets is a problem area that was addressed by conceptualising and contextualising it to a real-world environment: the phenomenon of England's BSF programme and its creation of LEPs.

Given the step change in tenor, sophistication and scale of the BSF programme, there was a set of expectations as well as a lack of evidence-based confidence as to what extent LEPs could meet the requirements from public sector clients to deliver long-term VfM and sustainability performance of their schools estate (House of Commons, 2015; HM Treasury, 2011c; James, 2011; PwC, 2010; NAO, 2009; Public Accounts Committee, 2009). It is possible to bring together all the collective learning points that participants in LEPs have learned over time, categorised by the inherent performance of the underlying portfolio of school buildings. This information needed to be analysed and abstracted into a more structured framework that

allows policymakers and practitioners to take decisions, to predict what might happen next, and to understand the connections about the experiences seen from other LEPs.

The central research question that motivates this thesis is therefore driven by the emergent issue that the need for LEPs to learn was poorly identified in the legacy BSF policy coupled with the argument that such demonstration of collective learning is possible and can reveal itself in complex strategic PPP procurement systems. The central research question is:

> **How can collective learning take place effectively for organisations collaborating in possible future strategic PPP procurement systems from the case of LEPs?**

A justified answer to this question is obtained by first exploring and discussing existing theories of organisational learning and collective learning; second, conceptualising a learning framework that can summarise and capture how collective learning can affects performance in a long-term portfolio PPP; and third, contextualising this learning framework to evaluate collective learning in LEPs by fitting a number of standard legacy BSF policy mechanisms for strategic partnering procurement, especially those encapsulated in the SPA.

1. Exploring and advancing existing theories of organisational and collective learning
Various theories of organisational learning have been explored with the support of two learning archetypes (Table 4-1 on page 100). One archetype addresses symptoms of performance problems of organisations: single-loop learning and operational, tactical decisions that are superficial and symptomatic. The other archetype looks to address root causes of performance problems of organisations. This is more conceptual and covers double-loop learning, deutero-learning, strategic insights and systems thinking (Kululanga et al., 2001).

The notion of systems thinking is explored in detail as it seeks to address a recurring theme in this research study: that of dealing with complexity in organisations (sections 3.3 and 4.6). The tools that come with the circular pattern of systems thinking can be applied in complex circumstances and management situations. Systems thinking is a conceptual framework with tools helping to see the whole rather than the sum of its parts (section 4.6 on page 105). It also helps to see circular interrelationships rather than linear cause–effect chains, and to see processes of change rather than snapshots. Some other concepts of learning are discussed as part of Senge's philosophy of learning disciplines, such as adaptive learning, survival learning and generative learning (Senge, 2006). Feedback is an essential part of systems thinking. It can be divided into reinforcing (amplifying) and balancing (stabilising) feedback. Continued learning is another essential aspect (Alberts, 1989; Bell et al., 2002; Lieberman, 1987; Tennant and Fernie, 2013). This can help organisations improve their intrinsic performance (see sections 4.9.1 and 4.9.3). The way in which the learning capacity is applied and adhered to (at individual, collective and organisational level) is also critical to enhance relationships between clients and suppliers as a basis for better economic performance. So, for these reasons, the ability of a project team set within such a strategic procurement context

to learn collectively and continue to do so over time is paramount for improved productivity and performance (Argyris and Schön, 1978; Bell et al., 2002; Kululanga et al., 2001; Nevis et al., 1995; Saint-Onge, 2002; Senge, 1990; Tennant and Fernie, 2014).

If participants that make up strategic partnerships are to become learning organisations, the revised TQM framework (Oakland and Marosszeky, 2006) could be embraced as the means to achieve this if it is tied in with the PDCA continuous improvement model (Cheng et al., 2004). Ideas of continuous collective learning over time allied to typical TQM aspects such as empowerment and partnership also imply that change is required from the status quo to the parties' commitment, the way they communicate and the culture when working together in partnership. The revised Oakland model for TQM (Figure 7-2 on page 172) aims at improving organisational Performance through better Planning and management of People and Processes in which they work (four Ps). The core of the model is performance in the eyes of the customer, which includes performance measures for all key stakeholders. This core needs to be surrounded by Commitment to quality and meeting customer requirements, Communication of the quality message, and recognition of the need to change the Culture of most organisations to create total quality and operational excellence (three Cs). These three Cs are the 'soft foundations' which must encase the 'hard management necessities' of the four Ps. While the literature review brought out a set of critical success factors of TQM and PDCA in isolation, these have not been integrated into a theoretical framework for strategic partnering in construction (as was discussed in section 7.3.2). The advantage of such a framework would be that it provides a conceptual road map for organisational learning scholars in order to demonstrate continuous collective learning over time.

The literature review exposed a number of critical features of organisational learning that need to be embraced in the construction industry (e.g. double-loop learning, collective learning and systems thinking). This pertains to the notion that strategic partnerships in construction can only operate if there is a portfolio of projects (as opposed to a single project), often with multiple interdependent organisations (section 3.4 on page 79) and with differing goals and objectives (section 4.4 on page 102). Strategic PPP procurement systems are a complex hybrid, comprising multiple organisations working together to deliver a portfolio of building projects. Besides, the idiosyncratic nature of social infrastructure means that there can be mixed procurement options (traditional and off-balance sheet), investment types (new builds and refurbishments), and social benefits (with or without extended local community provision). In this structure, it is reasonable to expect that contract mechanisms are imposed to make sure that performance requirements can be reviewed, at multiple levels and at regular intervals.

The literature review on organisational learning and collective learning also exposed aspects that scholars have not sufficiently studied and explained, and leaves a gap in theory (section 4.10). How learning can manifest itself in permanent construction organisations has been well researched by scholars (Argyris and Schön, 1978; Bell et al., 2002; Dodgson, 1993; Field and

Ford, 1995; Kupers, 2012; Levitt and March, 1988; Loch and Morris, 2002; Wang and Ahmed, 2002). How learning can take place in project-based TOs that are often seen in the construction sector has also been widely explored (Barlow and Jashapara, 1998; Chan et al., 2005; Cross and Israelit, 2000; Kululanga et al., 2001; Loch and Morris, 2002; McCann, 2011; Schwab and Miner, 2011; Tennant and Fernie, 2013). However, what is lacking is a common understanding of how this learning occurs in a complex hybrid form of project-based organisation (PBO), one where multiple permanent public and private sector organisations are working together strategically to form new long-term TOs on a repeating basis. This research tries to understand how learning can take place in this specific hybrid organisational structure. It is a relatively rare and complex organisation type that can be proposed by governments to attempt to procure projects in a more systematic way instead of piecemeal, and taking a whole-life value approach to projects.

Limitations from existing theoretical models were explored in section 7.6 (p. 186) in the context of PPP procurement policies that require development, delivery and operation of a series of projects to a contracted set of whole-life performance criteria. In such a complex procurement structure, it is important that lessons are learned and continue to be learned as the organisations involved move through the portfolio (from the first project to the next, to the following, and so forth) and through the lifecycle of each project.

Existing conceptual frameworks such as the generic continuous improvement framework by Ibrahim et al. (2010) or the learning model for construction alliances by Love et al. (2002) do not emphasise clearly enough the need for continuous improvement over time in the context of a portfolio of projects that go through a lifecycle. While all the elements of TQM are utilised when strategic PPP procurement systems are in business, there seems to be a lack of cognisance to these principles. While the conceptual model for a learning organisation in construction by Love et al. (2000a) encourages principles, tools and techniques of TQM, it does not fully consider what a coherent TQM philosophy of commitment, communication and culture (three Cs) and planning, process, people and performance (four Ps) can bring to a strategic partnership at each facet of the asset life. Existing learning frameworks as defined by Oakland (2014) and Cheng et al. (2004) lack the connection with systems thinking in the context of a portfolio of projects that foster a culture in which participants in strategic PPP procurement systems can make sense of a collective learning environment, by seeing the whole instead of the sum of its parts. The learning model for construction alliances by Love et al. (2002) does consider the need for programme evolution with high-end feedback systems in place and incentives that encourage participants involved to pass on the learning; however, it does not emphasise very clearly the need for continuous improvement over time. The long-term though temporary nature of strategic PPP procurement systems ensures that the underlying project companies need to be regarded as ongoing businesses that must generate long-term value on multiple strands (financial, operational, public relations, political, technical, commercial, contractual, marketing, human resources or ICT) instead of projects that need to

be finished on time and to budget. Existing models do not have feedback loops that cascade down to the learning across multiple strands of a business, as highlighted by Cheng et al. (2004). They propose major frameworks of reference for continuous improvement: originate new project pipeline with a clear strategic framework and targets (Plan); develop and produce with the support of implementation and management processes (Do); manage the operational assets with an enabling infrastructure of systems and mechanisms (Check); and take informed management action based on portfolio measurement and benchmarking (Act).

2. Conceptualising a learning framework for strategic partnering in construction

Having noted the significant complexity and scale inherent to strategic PPP procurement systems and having identified the gap in theory, the AVEM in Figure 10-1 has been developed and proposed as a generic conceptual framework for collective learning. The AVEM can be used as a framework to brief organisations prior to the start of a new project cycle, or to evaluate collective learning points after the end of a cycle. It is a composite of existing theoretical frameworks developed by scholars in the academic domain of management sciences, especially organisational learning.

The AVEM, as shown in Figure 10-1, is adapted from the model for construction alliances (Love et al., 2002), the continuous improvement model (Cheng et al., 2004), the learning framework for successful cooperative strategic partnerships (Morrison and Mezentseff, 1997), the revised TQM framework (Oakland, 2014; Oakland and Marosszeky, 2006) and Deming's Plan-Do-Check-Act cycle (Deming, 1951; Moen, 2009). The model also includes double-loop learning (Argyris, 1977) and the five learning disciplines by Senge (1990).

The AVEM was applied to BSF LEPs but its generic nature as a conceptual learning framework means it may be of use to any form of strategic procurement system, whether within the construction industry (LIFT, hub or bundled PFIs) or any sector with a need for organisations to collaborate over a long period of time to deliver a portfolio of assets. The AVEM can be split into an upper part (green) and a lower part (blue), in the same way as the learning model for construction alliances by Love et al. (2002) in Figure 7-8 on page 181. The PDCA continuous improvement model for strategic partnering (Cheng et al., 2004) can be tied in with the updated TQM framework (Oakland and Marosszeky, 2006).

The AVEM may be useful for academia and policymakers to explain and discuss at what point(s) the learning achieved in a strategic partnership structure creates an opportunity for changes (incremental or radical), and under what circumstances any observed lack of learning becomes disruptive. It is hoped that the use of the AVEM can be a step forward in thinking about how to manage complexity to avoid common danger gaps of losing control due to vague or unrealistic goals, blurred accountabilities, bureaucracy in management processes, data overload or flaws, or indecisive leadership failing to implement improvements. Given the increased complexity in strategic PPP procurement systems, learning should occur in a more systematic and collective way to avoid any danger gaps (as marked with orange flashes in the

AVEM). Examples to avoid these danger gaps and to encourage systemic collective learning include: protocols, communication tools, good governance, data sharing platforms, exercises and stress tests.

Any organisation that participates in a long-term strategic PPP procurement system has significant potential to develop knowledge that is gathered over time and shared collectively as the portfolio grows and projects in the portfolio progress.

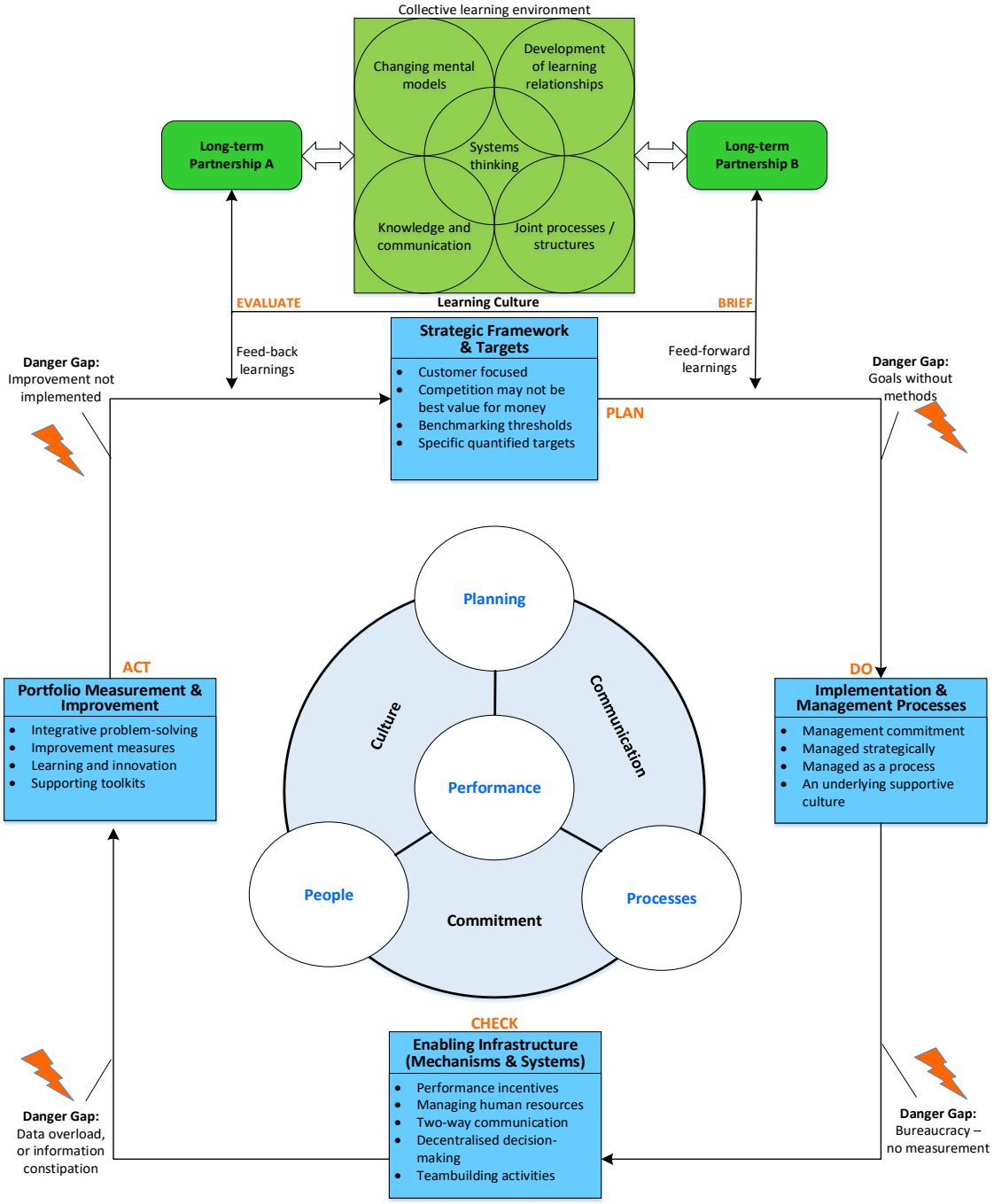


Figure 10-1: Asset Value Enhancement Model for strategic partnership procurement

3. The AVEM as a framework to evaluate collective learning in LEPs

The original BSF policy arranged the development and delivery of school infrastructure through LEPs, which are live examples of complex and strategic PPP procurement systems. Establishing and demonstrating the ability to observe collective learning in LEPs with the support of the AVEM answers the central research question. Tools for organisational learning encapsulated in the lower part of the AVEM (coloured blue) need to be firmly embedded within the existing LEP governance structures and beyond for those firms that have an interest in multiple LEPs, as enabled in the upper part of the AVEM (coloured green). The assumption or imposition to use the AVEM is the presence of a collective learning culture that encourages intra-organisational learning to take place between the key LEP participants and project-based learning by the project teams. Tennant and Fernie (2013) argue that embedding mechanisms for organisational learning is one of the greatest challenges to the creation of commercially viable and socially enduring supply chain management practice in construction.

One of the main problems in long-term strategic partnering in the built environment is that the client who specifies the customer requirements at the inception and development stage is rarely the same one that exploits the product when it is built. The AVEM seeks to encourage participants in the process to have a collective understanding of the values they require from built assets. For example, a building contractor (Do) could have an appreciation of what is required from school buildings in operation (Check). The same applies to LEP board directors, who may need to be aware that any management action based on portfolio performance (Act) may have a direct influence on the strategic planning of new projects (Plan) that the public sector may wish to grant to the LEP. The AVEM might assist the LEP partners to better tailor a project to a client's needs, by the imposition of well-considered feedback loops and by bringing in contractual incentives that encourage participants involved to understand the whole system and pass learning on. Having the AVEM contextualised to the real-world environment of LEPs demonstrates how collective learning might influence performance in a long-term portfolio PPP procurement system.

The central research question is answered conceptually, yet not empirically. To do so, the following sections (10.3 and 10.4) will answer research questions 1 to 4.

10.3 Discussion on the asset-level results

10.3.1 Impact of asset value criteria on individual procurement stages

The answer to the first research question explores the analyses of assets delivered by LEPs:

RQ1:
How do VfM and environmental sustainability considerations impact on the design, build, maintenance and operation of social infrastructure (LEP-built schools)?

The net effect ratios shown in Table 8-6 and Table 8-7 (p. 211) give an empirical interpretation in response to this research question, namely that the effectiveness of LEP-built schools to date is diverse in achieving contracted VfM and environmental sustainability criteria at each procurement stage and throughout the asset life. At each stage, a different asset value criterion (or set of criteria) was appraised against a rationalised KPI Target Level (Table 8-2). Some of these produced very crude results: sources for the application of Design Reviews, DQIs, and POEs are shown with a 'yes' on a dataset of schools with no further breakdown. Other asset value criteria are very specific, such as hard FM costs, soft FM costs and energy costs, but had to be normalised (£/m^2/year) and set to a base date before any meaningful analysis was possible. The normalising resulted in a reduction of the net sample size, as shown in Table 8-3 and Table 8-4.

Any net effect ratio >50% is considered high because it indicates that more than half of the net sample of LEP-built schools achieved an asset value criterion (or a combined set of criteria). Conversely, a ratio ≤50% is considered low. The assumption is supported by the fact that the representative sample size of each criterion in Table 8-3 and differentiator in Table 8-4 is corrected to exclude any errors and missing data. This caused a reduction in the sample of schools under analysis, especially after clustering data by higher capex standard and lower capex extended schools. These groups resemble both the criticism of BSF (too expensive schools) and aims of BSF (extended and/or community provision). However, after filters and corrections, Figure 8-5 and Figure 8-7 produced a sample size of only 11 PFI new build and nine non-PFI new build schools.

By breaking down research question 1, the following subsections engage in further discussion from the specific results in sections 8.5.1 and 8.5.2 and the graphs in Figures 8-4 to 8-7. Arguments are sourced from specific opportunities to learn from LEP participants in section 9.5.2 (and the results tables in **Appendix S**) and collective learning points over time in section 9.5.3 (with fully worked examples in **Appendix T**). These are generated through the data analyses and not driven by speculation. However, there might be other valid reasons that give rise to a discussion as to why ratios are high or low.

RQ1(a): Design impact

The VfM net effect ratios of schools that were subject to recorded Design Reviews are low regardless of the investment type or procurement option, except for lower capex extended PFI schools where 63% met the asset value criterion. Formal Design Reviews gave LEPs the ability to control any client-led design scope creep. Refurbishments were least subject to reviews. The fact that CABE no longer existed following the cancellation of BSF and stopped undertaking reviews from April 2011 was controlled for with 136 schools excluded from the sample of 600 as these were designed later (section 8.3.1 on page 202).

Sustainability net effect ratios for PFI are good at both lower capex and higher capex schools (78% and 64% respectively). Improving on DQIs at development stage may have become harder at times of austerity when LA clients' focus is to get more value for less money.

RQ1(b): Construction impact

Figure 8-4 and Figure 8-5 show that construction time ratios for refurbished schools outweigh the average. This may be caused by a too lenient standard KPI Target Level of 32 months, as shown in Table 8-2 on page 201. All scenarios by investment type or procurement option yield close to average ratios >50%, which confirms that for most LEPs the construction time KPI was achievable.

As for sustainability criteria, lower capex extended schools (Figure 8-6) show net effect ratios for meeting BREEAM 'Very Good or higher' with building services type 'predominantly natural ventilation' are high for any new build option (PFI and non-PFI). Refurbishments yield very low ratios (33%), as shown on page 214. This might be due to lower commitment to BREEAM on refurbished schools on a retained estate, or because expectations could not be achieved.

RQ1(c): Maintenance impact

The good VfM net effect ratios (98% to 100%) at maintenance stage for PFI schools can be explained by the fact that there is an effective Payment Mechanism and PMS that impose response and/or rectification times with provisions allowing LAs to incur deductions in case of underperformance. VfM ratios are also very good for non-PFI schools (100% on higher capex schools, and 87% on lower capex schools). This implies that both contract types incentivise clearly and significantly to ensure this aspect is delivered.

The sustainability ratio in Figure 8-6 is high for PFI schools at 70%. SPVs share energy consumption risk and FMs report against an energy target. Higher capex standard schools yield lower ratios for DECs regardless of the investment type or procurement route. Some of this can be due to a challenging energy regime in naturally ventilated schools and new building services sometimes do not run in line with agreed design specifications or have defects.

RQ1(d): Operational impact

The good VfM net effect ratios (96% to 100%) at operational stage for PFI schools can also be explained by the fact that there is a Payment Mechanism and PMS that impose response/rectification times with provisions allowing LAs to incur deductions in case of low performance. VfM ratios are also very good on non-PFI lower capex extended schools (100%); however, on higher capex standard schools, the ratio is below average (67%).

Sustainability ratios for Post Occupancy Evaluations (POE) are low regardless of the investment type or procurement option. This may be explained by the fact that since BSF was cancelled, there has been a low take-up on POEs as it was no longer the government's policy.

RQ1(e): Whole-life impact (DBMO)

PFI schools with extended provision built at lower capex match or exceed average net effect ratios for VfM or environmental sustainability criteria at all procurement stages, while non-PFI and refurbished schools (except for construction time) score average levels or lower. The

reason why PFI schools yield better ratios across the asset life can be explained by the fact that there is a Payment Mechanism and PMS, imposing response or rectification times allowing LAs to charge deductions in case of underperformance. PFI schools are incentivised to meet BREEAM ratings and have an energy consumption target. Net effect ratios for higher capex standard schools (Figure 8-5 and Figure 8-7) are more disturbed across the asset life. This implies that schools with a higher initial capital cost do not necessarily deliver whole-life asset value criteria.

10.3.2 Impact of whole-life VfM and sustainability criteria combined

The answer to research question two explores analyses of the full set of 600 LEP-built schools:

RQ2:
How can strategic partnership procurement systems (LEPs) be organised to deliver social infrastructure (schools) when requiring them to be both VfM and environmentally sustainable during the whole asset life?

Based on comparison of data of LEP-built schools against the rationalised KPI Target Levels, it can be observed, as shown in Figure 8-11 on page 218, that LEPs have a variable influence on achieving goals to meet whole-life VfM and environmental sustainability criteria combined.

PFI proves to be the most effective investment option to deliver these objectives across the whole asset life, yielding a net effect ratio of 20% for VfM criteria and environmental sustainability criteria combined (Table 8-9). Table 8-6 and Table 8-7 (on page 211) also suggest that it is more challenging to achieve whole-life KPI Target Levels for environmental sustainability than those for VfM, given the lower average net effect ratios. Figure 8-10 shows that extended schools built by LEPs at a lower capital cost perform slightly better than average against their whole-life asset value criteria. This might be explained by the unique opportunity of LEPs to adopt the whole-life value approach in PFI to non-PFI schools, applying the same rigor to WLC analysis.

The more cost-effective LEPs appear to be agile and flexible, taking a holistic and active approach to circumstances, seeking clarity on cost build-up, project and programme planning. A consistent and iterative process is applied, heavily focused on meeting summary cost benchmarks and where LEP supply chains can be interrogated directly by LAs.

Schools built at a lower capex also lead to less money being available for adding a large number of environmental technologies; engineering studies in schools show that the complex nature of building services systems can lead to subsystems working against each other (Dasgupta et al., 2012; Mumovic et al., 2009). Investing in passive building systems, complemented with a simple building services strategy and controlled by an effective BMS

system, is a key factor for good environmental performance of schools and reducing operational running costs.

By noticing that lower capex extended schools, especially PFI, perform significantly better across the asset life for both VfM and environmental sustainability criteria, there could be an argument that PFI schools are subject to more detailed and frequent reporting requirements and consequently the data mining yields better-quality results. Notwithstanding that, the argument is based upon schools meeting contracted performance criteria, which PFI assets seem to achieve better. There is, however, still a long way to go for LEP-built schools to fully adapt the achievement of whole-life asset value criteria for VfM and environmental sustainability combined (Figure 8-11 on page 218). Apart from the build stage, most combined whole-life asset value criteria yield net effect ratios ≤50%. The 600 LEP-built schools completed the D&B stages; however, ratios for the M&O stages can still improve as the assets mature over time, regardless of the investment type or procurement option. The learning from LEP participants suggests that this can be achieved by planned and preventative maintenance, benchmarking soft FM elements, lifecycle planning based on the condition surveys, improvement on energy targets, and tight contract management.

The number of schools that meet all VfM and environmental sustainability criteria combined is low (23 LEP-built schools out of 275); however, the variables in the datasets available were subject to a lot of missing data and errors which had to be cleaned. The proxy variable with the lowest number of schools (163 for POEs, which is after correcting for any missing data and errors) forms a better denominator: 23 out of 163, or 14%. While this percentage is still very low, it could possibly rise if better or richer data would become available, or if performance improves in the future.

Those new build PFI schools achieving both whole-life VfM and environmental sustainability criteria can continue to perform better by encouraging a tighter risk allocation and implementation of environmental innovation (Badi and Pryke, 2016). This is incentivised with this type of contract as demonstrated in section 10.3.1 for Maintain and Operate. Whether non-PFI new build schools and refurbished schools (that can retain the existing core structure of their buildings) can deliver better whole-life asset value criteria requires more emphasis on a longitudinal appraisal analyses.

The data analyses above prove that there are low net effect ratios and a low number of schools that meet whole-life VfM and environmental sustainability criteria combined. Consequently, it was difficult to identify those LEPs by their ability to deliver schools when requiring them to meet those criteria. However, it was possible to apply an alternative structure adapted from the IPD (now MSCI) Performance Framework Model, which categorises three key components for assessing property performance: efficiency, effectiveness and environmental sustainability. The model shown in Figure 9-6 on page 233 and its adapted version to include an extra collaboration category in Table 9-8 on page 234 will be discussed in the next section.

10.4 Discussion on the LEP as a complex PPP procurement system

10.4.1 Organisation performance of LEPs

The starting point was to look at the notion of whole-life value in infrastructure assets (section 3.2.4 on page 55 and Figure 9-4 on page 229) expressed in terms of criteria for VfM and environmental sustainability (chapter 2) across the DBMO procurement stages. The asset-level discussion is relevant, because it highlights programme-level insights into the root cause of the problem area (the lack of clarity and confidence about LEPs delivering contracted performance criteria). The asset-level appraisal outputs produced over multiple procurement stages effectively become the inputs for the organisation performance of LEPs. Those LEPs that are able to meet the combined whole-life asset value criteria across each procurement stage for predominantly most of their schools portfolio were selected for further research (i.e. >50% of the portfolio or at least seven schools). It is also relevant to analyse and discuss what worse-performing LEPs have learned and to compare those learning points with the better-performing LEPs. It was, however, not possible to explicitly isolate good- versus bad-performing LEPs. This was caused by the fact that asset-level data was subject to a set of input assumptions being applied (section 6.5.3) and a number of limitations (section 6.5.5). After applying the MCA, the volume of assets that met the asset value criteria were simply too low to be able to classify the selection of LEPs as 'Good' or 'Bad' performers. A selection of LEPs may have >50% of its schools portfolio that meet the asset value criteria but still have some schools that fail to meet them. Hence, there was a need to revise the intention to a more nuanced approach to classify them as 'Better-' or 'Worse-'performing LEPs.

Detailed QFD analyses of qualitative interview data pertaining to the selected better- and worse-performing LEPs was conducted to find out how the procurement model could be more effectively managed to ensure that contract participants can deliver ongoing VfM and environmental sustainability targets for the duration of the partnership. Hence, the third research question was explored:

RQ3:
How do you effectively measure and manage performance of a strategic partnership procurement system (a LEP) for social infrastructure?

In response to this third research question, triangulation of data generated from BSF legacy policy documentation and from various key participants involved in LEPs has shown that there is a very high priority on the requirement to perform, and to continuously improve. The option by public client organisations to impose contractual requirements on the private sector to perform is not a new phenomenon in the construction industry. The 12 key contract performance mechanisms identified under the original BSF policy, shown in Table 10-1, were also in the preceding NHS LIFT policy and most of these are also included in the successor

Scottish hub policy. Each contract performance mechanism was previously discussed in section 6.6.1 and 9.3 on page 144 and 230 respectively, with further detail in **Appendix G1**.

To explore the effectiveness, these mechanisms can be apportioned to a quadrant in the AVEM in Figure 10-1 on page 259, meaning that the AVEM can be operationalised for the benefit of both policymakers and practitioners.

Stage	Contract performance mechanism	BSF contract reference
PLAN	**1. LEP Company Business Plan**	**SHA, Schedule 3**
	2. Partnering Services Specification	SPA, Schedule 12
	3. Collective Partnership Targets	**SPA, Schedule 14, part 1**
DO	**4. New Projects Approval Procedure**	**SPA, Schedule 3**
	5. Cost Benchmarking Procedure for new projects	**SPA, Schedule 21**
	6. Market testing procedure for new projects	SPA, Schedule 4
CHECK	**7. PFI Payment Mechanism & PMS**	**PA Payment Mechanism, Schedule 6**
	8. Non-PFI FM/ICT Payment Mechanism & PMS	**SA Payment Mechanism, Schedule 5**
	9. PFI Benchmarking & Market Testing	*PFI Project Agreement*
ACT	*10. LEP/SPV Board Report & Management Accounts*	*Management Services Agreement*
	11. Key Performance Indicators	**SPA, Schedule 14, part 2**
	12. Continuous Improvement Targets	**SPA, Schedule 15**

Legend: **Bold** = selected for interview survey data analysis.
Regular = selected for interview survey data analysis, but did not deliver enough responses.
Italic = added after the interview surveys, hence no data could be collected for further research.

Table 10-1: Key LEP contract mechanisms in BSF standard form of contracts

To ensure its validity and utility, the AVEM has been tested in a real-life strategic partnering environment of operational LEPs and the findings were validated with a panel of industry and policy experts. Following completion of the full interview survey, it transpired that the data collected about the Partnering Services Specification and the Market Testing Procedure yielded insufficient data to perform analyses using the Asset Value QFD. The PFI Benchmarking & Market Testing and the LEP/SPV Board Report & Management Accounts were added in *italic* to the list after the interviews were conducted, so no data was gathered from respondents on these mechanisms.

In summary, in order to effectively measure and manage performance of strategic partnership procurement systems (in this case LEPs) for social infrastructure, it is imperative to first appraise and analyse the performance of the underlying projects (in this case schools) based on a set of agreed whole-life asset value criteria. These will then become the basis to subsequently evaluate how the strategic PPP procurement system is performing. Thus, the whole-life asset value criteria for LEP-built schools and the underlying contracted LEP policy mechanisms should be regarded as interdependent. They connect the value of the asset for the client with the business benefits that accrue from the creation of new value. In a PPP structure, these beneficiaries are both public and private sector organisations. The use of the AVEM can help to capture the learning during all stages of procurement, which is essential for future cycles of asset creation. However, the only way in which greater value added can be achieved in the future is through deep understanding of the existing portfolio assets.

10.4.2 Linking whole-life asset value with organisation performance of LEPs

The need to demonstrate and evidence the substantial link between asset value and organisation performance was explored in section 9.3 on page 228–230 to allow a justified answer to the fourth research question:

RQ4:
How can key contract performance requirements established by a client (in this case a LA) and its strategic partnership procurement system (in this case a LEP) be measured and managed effectively to ensure whole-life VfM and sustainability targets can be delivered?

In response to this research question, it was found that working with the contract performance requirements very much depends on the level of experience of the LEP partners to meet LA client's expectations in relation to the achievement of contracted asset value criteria for whole-life VfM and environmental sustainability of school buildings. It was possible to apply the AVEM, and apportion to each quadrant the contract mechanisms as set out in Table 10-1. In the context of LEPs, the AVEM can be implemented by presenting how selected LEPs perform compared to the average benchmark in the market. If the selected LEPs perform higher than the benchmark, then learning can be demonstrated and presented using the AVEM as a learning framework. If the selected LEPs perform below the average benchmark, then learning should occur, again using the AVEM as a framework of reference, at each stage of the AVEM comparing better- to worse-performing LEPs for each category: (1) whole-life VfM efficiency; (2) cost-effectiveness; (3) environmental sustainability; (4) collaboration.

The Asset Value QFD software tool delivers prioritised insights into collective learning points of key participants involved in LEPs (sections 9.5.1 to 9.5.3), associated with complexities they face to meet contracted quality expectations agreed with the public client. Having such a tool enables systematic capture of collective observations and learning points from key LEP participants about standard contract mechanisms in place to deliver projects at multiple stages of their lifecycle. This may reveal any complexities in the delivery of contracted performance criteria for long-term VfM and environmental sustainability. Using the Asset Value QFD as a tool, it is possible to identify three categories of findings:

1) Specific opportunities to learn from those LEP participants that move from project to project (project-based learning);
2) Collective learning points from organisations involved in and between LEPs (intra- and inter-organisational learning); and
3) Considerations from organisations that continue to learn collectively over time (systemic learning).

Effectiveness of ten key contract mechanisms encapsulated in the SPA were evaluated for its use in practice by analysing the LEP's collectiveness about what was learned based on the underlying asset performance. One could also focus on the uniqueness and seek learning from that, but because of the PPP environment and the idiosyncratic nature of infrastructure,

it is sensible to focus on what was learned collectively as a group or team. This is in line with the learning archetype (Table 4-1) to address root causes of performance problems (rather than symptoms).

Following a detailed survey of 69 interviews, the collective learning from key LEP participants involved was captured using the lower part of the AVEM as a framework of reference. In answer to the research question, the learning points are as follows:

Strategic Framework & Targets (Plan)

- The LEP Business Plan is regarded as being very effective at showing the yearly pipeline, shareholder ROI, director fees, dividends, turnover and resource forecasting. It provides some alignment with the parties' common understanding about future goals and a framework to achieve those. It helps investors to be agile, flexible and take a holistic approach to strategic dilemmas. When distrust occurs due to different agendas between the LA and the LEP, the plan offers support as a tool to re-strengthen relationships or resolve a 'man-marking' culture. It offers delegated authority to LEP resources, and serves as a guide for directors to allocate sufficient budget to new business development. The plan encourages LEPs to adopt a whole-life value ethos and approach to all its assets, not just PFI.
- Few respondents were aware of the Collective Partnership Targets (CPTs) which are there for the LEP to help achieve the authority's strategic objectives. The collective judgement about the CPTs is fairly aspirational, and only useful against the original BSF policy. There was limited collective learning and LEP partners failed to be pragmatic about the targets. An independent chair to the LEP board would be more engaged to seek long-term value from CPTs for both the LA and the LEP. For CPTs to become effective, it needs to have strategic priority from both public and private sector parties. Clearly, LEPs alone cannot be in full control to link buildings with strategic outcomes, such as education attainment.
- Recognition of the Partnering Services Specification was also low. The mechanism is appended to the contract as a 'schedule of rates' for LAs to call services from the LEP. The data received did not yield sufficient entries to measure collective observations from LEP participants. This lack of learning drawn from the Partnering Services Specification is an observation that reflects most LEP parties' lack of cognisance to its complexity. However, the fact that not much has been learned from it does not mean that it was not applied.

Implementation & Management Processes (Do)

- A LEP could only perform if it achieves the criteria in the New Projects Approval Procedure (NPAP). The NPAP is seen as very intensive and effective. Some LEPs applied the NPAP on up to eight projects in parallel. The NPAP is robust and clear: planned, staged, time-bound with a fixed set of deliverables. It encourages enhanced governance, joint working

and stakeholder engagement. But there also lies a problem: freezing the design for gateway reviews, lessons learned and due diligence (up to nine times for some LEPs) take time and effort and do not necessarily add to the quality of the end product. Involving too many third parties in the design process and continued involvement of school leadership needs to be limited. On the other hand, extra LA approval points ensure that projects rarely go back for revision. The NPAP was tailored to local needs and evolved over time.

- The Cost Benchmarking Procedure can deliver confidence that LAs get VfM within the benchmark thresholds stipulated, and commercial control/cost certainty for investors. It is judged effective for like-for-like building elements only, but non-standard cost items (e.g. abnormals, refurbished elements, or schools with mixed provision) are subjective. Better skills are needed for LEPs to interpret those. Benchmarking fails if thresholds are exceeded, cost elements are subjective, or if comparison data is lacking. In that case, LAs can insist on quotes of work packages, negotiate directly with the schools, opt to market test or procure works outside the LEP. The open book approach encourages a level playing field for both parties and LAs have the ability to interrogate supply chains directly. It is only designed to encourage LEPs to aim to maximise VfM out of an allocated target cost, not to make real bottom line savings. TAs are jointly appointed by LEPs and LAs to undertake due diligence reviews of cost data, which may still not convince the VfM of bids. The procedure needs separate benchmark thresholds for different type of projects, and a percentage saving on target costs.
- Data received about the Market Testing Procedure for new projects delivered insufficient entries to measure collective observations from LEP participants. The lack of collective observations and learning points drawn from the procedure is an observation that reflects most LEP participants' lack of cognisance about its complexity. The lack of collective learning, however, does not mean that the Market Testing Procedure was not applied.

Enabling Infrastructure (Check)

- The PFI Payment Mechanism drives a tight FM Performance Measurement System (PMS) whereby detailed self-monitoring is required. The mechanism is judged very effective: risks are transferred, it safeguards lenders' assets, gives reference if issues arise, all while schools continue to be maintained. But it can be abused, with misreporting by the private sector or by LAs not allowing sufficient leeway for relief on extended rectification times. Inaccuracies may cause high penalties against small failures, or too lenient rectification times. Managing such issues can get very contractual, and this may impair the partnering relationship if LA expectations become unrealistic. Real performance can be achieved if an interim manager is appointed by the LA who can act impartially. Adhering strictly to standard PFI models can be problematic if LAs interpret them differently and local agreements are being made with FMs to make it work. It is better to regularly revisit

deduction levels for critical areas to fit LA needs or changes. This can prevent any ambiguity leading to tension and entrenchment.

- If applied genuinely, the non-PFI Payment Mechanism and PMS give contract parties comfort faster, protect LAs and LEPs, and incentivise supply chains. While obligations are met, end users can still perceive their building as expensive or failing. They expect to have a shiny building every day. Besides, LAs are often dissatisfied with quality of data received from contractors and FM providers. Their relationship deteriorates if reported performance or deduction levels stay unresolved or disputed. LA clients should learn to oversee and manage a portfolio, instead of taking a case-by-case approach. Especially for ICT contracts, an extra layer of LA client support may be needed to monitor performance.

Portfolio Measurement & Improvement (Act)

- At D&B stage, Key Performance Indicators (KPIs) point contractors to their goals, but the collective view is that they are tough to achieve and data collection was often abandoned. At M&O stage, KPIs drive openness, good behaviour and delivery. The effectiveness of KPIs is limited though: LEP participants find it a burden, time-consuming or a less important tick-box exercise. While locally its relevance is proven, KPIs have become irrelevant since BSF was cancelled. Besides, if LAs have a lack of emphasis to interrogate KPIs, it disrupts delivery. A LEP approach to KPIs should give LAs a constant feedback loop on portfolio performance to standards. But, without sufficient workload, the link to exclusivity weakens depending on the number of schools in a LEP's portfolio. Working with KPIs creates a moment for all to take stock and analyse a LEP's operations. In theory, KPIs can drive genuine behaviour and service delivery, with a long-term view. In practice, the focus was on ways to manage the project cheaper: if LEPs fail to prioritise KPIs, it means LA clients have an extra negotiation lever. Working with KPIs can bring consistency, be prescriptive, idealistic and input-based. Consequently, KPIs turn out to reduce innovation or become politically challenging to uphold.
- Continuous Improvement Targets (CITs) were intended for LEPs to deliver VfM, and create momentum to persevere, not to stop and pivot. This has not occurred and in reality the mechanism had limited effect. At D&B stage, teams did work on CITs (e.g. one LEP moved from on-site construction to off-site design for manufacture and assembly plants, yielding cost, time, quality and health and safety benefits). FM Co's participated in value engineering workshops and lessons learned sessions at project development stage to advise how building elements impact during M&O. CITs create a culture of wanting to improve and to tell parties what has to improve. However, the targets become hard to achieve if LAs only aim to get more value for less money, and no longer value quality designs and quality service.

Underperformance in contract mechanisms leads to an opportunity to find a remedy before it comes to a right to remove exclusivity on the part of the client. Any termination of project agreements, non-payment of funds by the LEP and insolvency in relation to the LEP would

give authorities the right to remove exclusivity. Some contract mechanisms were required, but considered less effective such as: Partnering Services Specification, CPTs, KPIs, and CITs. In practice, the LEP model only incentivised contracted organisations to demonstrate best VfM in its BSF projects by the imposition of an annual LEP Business Plan, the use of NPAPs along with cost benchmarking, payment mechanisms and cost recovery from successful project delivery.

Before BSF was cancelled, the strategic PPP procurement philosophy applied was that the existence (and exclusivity rights) of a LEP is contingent upon performance standards being achieved in a number of contract mechanisms (Table 10-1). If a LEP did not perform according to the conditions, it might lose the exclusivity and cease to exist. This is driven by the fact that in the absence of competition (section 3.5), the public sector needed a mechanism to incentivise the private sector partner to perform. In reality, no LEP has lost exclusivity due to underperformance.

10.5 Summary of chapter 10

The purpose of this chapter was to discuss the central and related research questions and to frame this discussion as the rationale that led to the development of the AVEM as a learning framework for strategic PPP procurement systems. The focus of this research was to understand better the needs and opportunities for collective learning when the context is a sophisticated procurement system that involves long-term partnership working across the public and private sector. The key result of this research is the proposed AVEM, which emphasises the need for continuous learning over time in the context of a portfolio of projects that go through a lifecycle, and that lessons are learned and continue to be learned. It promotes a TQM philosophy at each facet of the asset life. Importantly, the AVEM makes a connection with systems thinking in the context of a portfolio of projects, by focusing on the whole instead of the sum of its parts, with high-end feedback loops and incentives that encourage participants involved to pass learning on.

This research has drawn from a unique procurement system that the UK deployed in the late 20th century and that was summarily curtailed in the early 21st century. From the detailed data, it has been found that LEPs that were established prior to the closure of BSF appear to have had the potential to deliver more VfM – more efficient and cost-effective – and more environmentally sustainable schools in the long run. Analysis of the asset-level data suggests that a few LEPs appeared to achieve that, others did not, and for some LEPs, it is hard to answer. The lack of definitive statements reflects the nature and quality of the data collected and available to analyse.

If delivering whole-life VfM and environmentally sustainable schools was proving to be really hard, then one might wonder whether the LEP model as a strategic partnership procurement system was all too ambitious, whether a starting position where almost no LEP can achieve

the standards set for schools is fair, whether an appraisal ten years after the BSF policy was launched proves that all LEPs are achieving it routinely, or whether more time and better data is needed to evaluate the effectiveness of the LEP as a procurement system.

For those seeking headline results, there is no single LEP that can be classified with superlatives such as ‘excellent’, ‘stunning’, or ‘outstanding’ as there is not one LEP that fits in all four categories for better performance (coloured blue) shown in Table 9-8 on page 234. Also, the proportion of schools that meet a combined set of asset value criteria in a category in most cases is below 50%. These observations suggest that for the legacy BSF market, the research contributions depend on individual characteristics and circumstances of each LEP.

Confidence in the proposed AVEM and its utility in application was validated at an expert workshop on 23 March 2016 (section 9.7). The workshop participants validated the implementation of the AVEM as a conceptual learning framework by using the results generated from the detailed LEP-level data analyses. The group felt that the AVEM attempts to explain something very complex (strategic PPP procurement systems) in a conceptual learning framework that is relatively easy to comprehend. They felt the AVEM is less complex to understand and appreciate when it is applied in a facilitated workshop environment.

The final chapter will present the reflected conclusions and justified recommendations that arise from this research endeavour.

Chapter 11 – Conclusions and recommendations

This chapter commences with an overview of the thesis submitted for the qualification of PhD, followed by the study's contribution to theory in section 11.2 and methodological contribution in section 11.3. Sections 11.4 and 11.5 will address the research objectives by building on the answers to each of the five research questions discussed in chapter 10. Any contributions for policy and practice are outlined in section 11.6. Additionally, practical limitations of the research results are presented in section 11.7, and recommendations for a future research agenda on theory, policy and practice of strategic PPP procurement systems in construction are provided in section 11.8. Finally, section 11.9 covers a reflection of the researcher's role and background beyond the research study.

11.1 Overview of the PhD

This research explores how organisations involved in longer-term temporary joint ventures established as strategic PPP procurement systems in construction arrange themselves and learn collectively to deliver a portfolio of social infrastructure. This general interest has had specific focus on the ability to meet or exceed agreed criteria for whole-life VfM and environmental sustainability. Theories and tools that underpin collective learning affiliated to temporary organisations are investigated for relevance and suitability. After exploring the science domain of organisational learning, it was found that there is a perceived lack of investigation into and clarity regarding the systematic way in which participants involved in such strategic partnerships can learn collectively and how this affects their own and collective performance. The research also explored new insights into principles of VfM and partnering in construction, risks and benefits in complex procurement, project-based environments, TQM, systems thinking and performance improvement inherent to strategic PPP procurement systems in addition to the existing knowledge base.

Since 2010, at the heart of the global financial crisis, relevant public policies became subject to critical scrutiny by the UK's 2010 coalition and 2015 Conservative Party governments, including the effectiveness of complex strategic PPP procurement models, and the delivery of whole-life VfM and environmental sustainability criteria for social infrastructure assets. Research in these areas is significant because the use of strategic PPP investment vehicles in delivering portfolios of social infrastructure is a relatively new phenomenon, both in the UK and globally.

The work comprises a critical evaluation of strategic PPP procurement systems for the delivery of social infrastructure, taking the case of an ambitious programme in England entitled BSF, and its delivery vehicle called LEPs. BSF was extremely ambitious in what it sought to do, was to cost a very considerable sum of money to achieve its objectives, and demanded a sophisticated organisational and project level of activities to be set up. The entire BSF

programme was abruptly cancelled part way through. This made this research challenging, but also important, as there are similar systems, such as LIFT for community healthcare in England, and the hub model for social infrastructure in Scotland. Besides, in the UK and internationally, PFI contracts often comprise a portfolio or bundle of social infrastructure assets into a single contract. All these bundled or portfolio-type PPP structures have aspects of systems thinking, supply side integration, whole-life value, and collaboration philosophies.

For the above reasons, exploratory research has been executed based on a mixed methods approach comprising both quantitative aspects (numerical survey data) and qualitative elements (interviews) allied to a phenomenological dimension (the case of BSF LEPs). Of the 44 LEPs that were established, 12 have been investigated as a form of strategic PPP procurement in England, as well as 600 schools worth approximately £9bn delivered by all 44 LEPs between 2006 and 2015 as part of the legacy BSF programme. LEPs that reached financial close prior to the programme termination date of July 2010 are analysed, especially those that reached high levels of maturity. Contracted performance parameters of schools procured by LEPs for VfM and environmental sustainability were identified and analysed across the procurement stages: design, build, maintain and operate. Further data is obtained from a major survey of 72 participants involved in 12 operational LEPs, along with their contractual and financial PPP/PFI development and delivery structures.

Taking the case of BSF LEPs, evaluating the effectiveness of strategic PPP procurement systems to support the delivery of VfM and environmentally sustainable assets during the full asset life proved to be a challenging undertaking. LEPs were deemed to have failed to achieve their objectives against the socio-economic background, as was discussed in sections 2.2 and 2.3, especially the evidence for PPP procurement models to address climate change and deliver VfM infrastructure assets. The analyses have also shown that there are numerous observations that corroborate some of the findings set out in the DfE Review of Education Capital (James, 2011), work by the Education Select Committee (House of Commons, 2015) and others referred to in section 2.5.2 and **Appendix C3**.

First, it is relevant to understand in detail the empirical phenomenon of the BSF policy prior to its cancellation: what outputs it created and how these perform against the original objectives. Second, based on the results and with the support of the AVEM proposed in section 7.6, it has been shown to be possible to evaluate collective learning points from participants behind the LEPs that were responsible for delivering these outputs. Hence, there are two research objectives:

Research objective 1 – Asset level:
To understand what the client's key asset performance criteria are in projects delivered by strategic partnership procurement systems, and explore how these requirements are appraised empirically for these joint ventures to deliver whole-life VfM and environmentally sustainable buildings.

Research objective 2 – Organisation level:
To explore how key contract mechanisms are being judged by the participants in strategic partnership procurement systems, and to evaluate what their collective learning observations are, to be able to meet clients' expectations related to the achievement of whole-life VfM and environmental sustainability criteria agreed on projects.

Both research objectives were established in section 1.3 to address a general observed lack of clarity about how the quality of strategic PPP procurement systems affect the long-term VfM and environmental sustainability performance of social infrastructure (OJEU Regulations, 2015; UN FCCC, 2015; IPCC, 2014; UK Parliament, 2008). In the context of legacy BSF projects with LEPs in exclusivity, the recent UK governments showed a lack of confidence in the extent public clients obtain long-term VfM and sustainability performance from their built assets (House of Commons, 2015; HM Treasury, 2011c; James, 2011; PwC, 2010; NAO, 2009; Public Accounts Committee, 2009).

It is possible to bring together all the collective learning points that participants in complex strategic PPP procurement systems have experienced over time. These can be categorised depending on whether inherent performance of the underlying portfolio of social infrastructure improved or worsened. To demonstrate how collective learning can appear, a question arises: how can collective learning take place effectively for organisations collaborating in possible future strategic PPP procurement systems from the case of BSF LEPs? The answer to this question was discussed in chapter 10 with the development of a conceptual learning framework. The next section will summarise this framework as the main contribution to theory in this thesis.

11.2 Contribution to theory – Developing a conceptual framework

This research seeks to make a real and timely contribution to the ongoing debate about the systematic way in which organisations involved in complex strategic PPP procurement systems for social infrastructure can learn collectively and how this affects performance of the outputs.

The role of strategic PPP procurement systems for delivering elements of social infrastructure is a relatively new phenomenon in the British construction industry and abroad. From the early 1990s, the UK government recognised the option and possible advantage of involving the private sector in the delivery of public services. This introduced the notion of working in 'partnership' and this recognised the long-term and significant level of interaction needed to ensure success. For this form of partnership working to be successful, there is the fundamental need for effective contracts to be put in place to act as the foundation for what will then happen (Dyer and Singh, 1998; Poppo and Zenger, 2002), but a partnership will only work well if the parties to the partnership accept the need for finding optimal ways of working together (Smyth

and Edkins, 2007), both to allow the contract to be enacted and to deal with the many situations that the contract will be silent on but which need to be addressed (Hart, 2003). The strategy for this type of procurement system is to develop, deliver and maintain assets to which complex performance can be derived (Roehrich and Lewis, 2014). This all implies a clear need for the parties involved to be encouraged, willing and able to learn (Brady et al., 2005a; Davies et al., 2011). The novel and unique contribution to theory made by this thesis is to focus on how the parties to this complex form of PPP learn collectively.

The specific focus on collective learning in strategic PPP procurement systems distinguishes this thesis from previous studies, such as the learning framework for successful cooperative strategic partnerships (Morrison and Mezentseff, 1997), the learning model for construction alliances (Love et al., 2002), the continuous improvement model (Cheng et al., 2004), the revised TQM framework (Oakland, 2014; Oakland and Marosszeky, 2006) and the project capability model (Brady and Davies, 2004).

These existing theoretical models assume that participants involved in the strategic temporary PBOs established to take responsibility for a portfolio of projects (as opposed to a single project) continue to learn as they move from the first project to the next, and so forth, and as individual projects mature over time. However, these either lack a connection with systems thinking and feedback loops that foster a culture of collective learning, or do not consider a need for continuous improvement over time on both a project-by-project and portfolio basis. Unless there are contractual incentives for participants involved, they may fail to learn collectively or even as individual parties, a prerequisite to success. Much has been written about organisational learning (Argyris and Schön, 1996; Cohen and Sproul, 1991; Levitt and March, 1988; Senge, 1990; Nevis et al., 1995; Argyris and Schön, 1978), but it has only been since the mid-1990s that scholars have started to gauge and capture what capabilities construction sector-related temporary project organisations should possess to be functionally and commercially successful (Brady and Davies, 2004; Cheng et al., 2004; Franco et al., 2004; Love et al., 2015a; Love et al., 2002; Love et al., 2000b; Kululanga et al., 2001; Bresnen, 2009).

What, however, is lacking is a common understanding of how collective learning takes place in a complex hybrid form of organisation, one where multiple permanent public and private sector organisations are working together strategically to form new long-term TOs on a repeating basis. This organisational and procurement phenomenon has occurred at scale in the UK where strategic PPPs such as LEP, LIFT or hub companies are created to develop, deliver and operate a series of long-term capital projects. This research tried to understand how learning can take place in this specific hybrid organisational structure.

The AVEM was developed and introduced by the author (section 7.6) as a conceptual learning framework for key participants involved in strategic PPP procurement systems to learn

collectively, and to evaluate how the learning (or lack thereof) affects the whole-life performance of the assets in the absence of competitive pressure.

This proposed AVEM seeks to make a contribution to the body of science of organisational learning, and especially continuous collective learning. The assertion is that collective and continued learning over time influence organisational performance positively. A double-loop effect through the AVEM turns specific learning points (project-based learning), collective observations (inter- and intra-organisational), and collective learning over time (systematic learning) into an abstract form to give rise to a deeper understanding of root causes to performance problems that could apply from project to project, and across a project's asset life. In permanent organisations, learning and performance can be accelerated, for example, by incentives such as deadlines or competitive pressures in the market. However, in long-term temporary strategic partnerships, there is an absence of such competition (section 3.5), hence the need for a framework with tools that can support a collective learning environment and learning culture.

Discussions in chapter 10 pointed out that the need for participants in portfolio PPPs to learn collectively and continuously are crucial factors for achieving better VfM and environmental sustainability performance of assets delivered by LEPs. This was demonstrated by testing multiple scenarios through the implementation of the AVEM on selections of LEPs that are more versus less adept at delivering whole-life VfM efficiency, cost-effectiveness, environmental sustainability and collaboration on their projects.

The contribution to theory in the context of LEPs is explained with the help of the five learning disciplines (Senge, 2006) in the upper part of the AVEM (Figure 10-1). The double-loop effect that was described in section 7.6 turns the learning legacies from LEPs obtained in the lower part of the AVEM into an abstract form in the upper part, to give rise to a deeper understanding of root causes to problems that could apply generally. If the LEP participants are going to learn, they will need to be facilitated with an environment in which learning can occur collectively.

The essential components of the upper part of the AVEM model as adapted by (Love et al., 2002) from Senge's five learning disciplines (section 4.5) are intentionally chosen to facilitate this environment and foster an encouraging learning culture with the parties involved in the partnership. They now form part of the AVEM which itself is novel in that it connects the five learning disciplines and feedback loops that foster a culture of collective learning, while also considering a need for TQM and continuous improvement over time on both a project-by-project and portfolio basis.

The subheadings below are therefore seeking to make contributions to knowledge following Senge's five learning disciplines in the upper part of the AVEM, by taking the collective learning points obtained in section 9.6 following the evaluation of LEPs into a more abstract form.

1. Systems thinking

The ability to move the learning points developed over time through a widespread number of stakeholders both within and across organisational boundaries requires the parties to understand how its subsystems are interconnected, and how they can individually influence the quality of the final product or service.

Results show that LEPs can pass critical learning points on to a next stage of the AVEM. This enables the relevant parties to see relationships between issues, events and information as a whole or as patterns, not as unconnected parts, as demonstrated by the collective learning curves shown in section 9.5.3. The learning curve effect can encourage participants in strategic PPP procurement systems to gradually enhance performance in the absence of competitive forces in the supply chain (sections 3.5 and 4.9). Using the AVEM offers a framework of reference that helps to explain and debate at what point(s) the collective learning achieved in strategic PPP procurement systems creates opportunities for changes (incremental or radical), and under what circumstances any observed lack of collective learning might become disruptive.

In the lower part of the AVEM, each of the PDCA stages taken from Deming's seminal work can be populated with standard procurement policy mechanisms to enable each of them to be analysed not just in isolation, but as part of a wider composite. Firstly, each of the PDCA stages can be linked to each of the four pillars of TQM (four Ps) as shown in section 7.3.2, and questions can be asked about what key parties have learned about committing, communicating and the culture towards using the policy documents (three Cs), both as a collective PPP and as individual participants within. Secondly, using systems thinking, the upper part of the AVEM allows policy and practice to think about how to learn as a collective team from project-to-project (project-based learning), as participating organisations (intra-organisational) or between multiple partnerships that these organisations – some are major contractors and investors – might have an interest in (inter-organisational). In this way, learning from better- and worse-performing LEPs can be retained for the future and shared systematically between the key parties concerned to encourage good practice and to prevent similar mistakes reoccurring.

2. Development of learning relationships

All participants involved in strategic PPP procurement systems learn to a greater or lesser extent while it is equally common that learning is not achieved if they repeat their mistakes, fail to adapt to client needs, or are not able to improve their processes to meet competitive standards. Even when organisational learning occurs, it is often accidental rather than intentional. Without an intentional process to stimulate development of learning relationships, most parties are ineffective learners and much that could be learned is lost or missed, and consequently affects output performance.

Parties involved can use tools to capture knowledge and continue better momentum from retaining intellectual capital. In this research, results from some LEPs show that collective learning over time did become an area attracting increasing attention when valuable individuals or firms involved decided to no longer stay with the partnership after many years of service. At an individual level, learning relationships can be stimulated with a formalised handover, at project level through 'soft landings' and at organisational level through transition planning.

Applying the AVEM at pace and at high frequencies as a strategic partnership delivers a portfolio of projects not only allows collective learning to be recorded and memorised, but importantly it also provides management information to allow decision makers to take corrective action on existing projects or direction for the next project. The benefit when all participants use the relational skills to bother about learning while working on their projects is that, despite all the different interests that play, the learning culture creates a synergy that makes the partnership more agile and resilient. Participants in LEPs have a set of contracts supported by a governance structure where multiple parties meet and report at regular intervals (annually, quarterly and monthly) and at various levels (individual, project and organisational). Adopting this approach could create the synergy required from collective learning in a strategic PPP procurement system where the whole is greater than the sum of its parts if the parties are collaborating with a common purpose.

3. Joint learning processes/structures

A collective comes together to form an organisation in order to achieve a complex mission or task, one that is too complex for an individual to fulfil. Joint learning can be stimulated by evaluations, collaboration sessions, sophisticated asset management tools, and good governance, with incentives documented within the legal structure.

Results show that LEP participants do not have defined joint learning processes and structures in place. Opportunities to reward, motivate and incentivise collective learning were not identified through the suite of standard contract mechanisms.

Collective learning processes and structures are encouraged in the lower part of the AVEM so that that the most critical learning is captured and passed on (for example when teams/individuals progress in, leave, merge or acquire an organisation). Importantly, the circular model calls for a joint commitment, shared culture and aligned communication (three Cs) to allow organisational performance through better planning and management of people and processes with which they work (four Ps).

4. Knowledge and communication

The AVEM (or something similar) is needed to improve the chances of collective learning as it structures, facilitates and encourages knowledge sharing and increased

communication. Without such a framework, this is not occurring and this deficit is detrimental to the strategic objective being set of strategic PPP procurement systems.

Results show that there are ample ways for LEP participants to share knowledge and interact with each other, exchanging their data, conclusions, arguments and questions with others, instead of passive listening to speeches and presentations. Collective learning is more apparent when LEP participants communicate with each other as equals rather than as separate parties in a hierarchy. The results also show that keeping a sharing integrity of the parties' data is judged as good to excellent by up to three LEP participants at all stages. This implies that knowledge is not being communicated openly with all six key participants as it could be.

The AVEM offers abilities to foster an environment where collective learning becomes the new normal in a strategic PPP procurement system. This is encouraged by active use of data sharing platforms, good governance and gateway reviews at each of the quadrants in the AVEM.

5. Changing mental models

This change can be preceded by organisational learning when, for example, a LEP learns from its client that a change in the service is needed. It is also possible for change to occur without being preceded with learning (for example, the abrupt cancellation of BSF necessitated changes to the shared mental models of the LEP and participants involved). When such change occurs, it is followed by organisational learning, but not preceded by it. Results show that incremental changes occurred in long-term embedded beliefs of both public and private sector partners involved, which demonstrates that they can adapt and be agile to new circumstances.

The AVEM not only offers the ability of the strategic PPP procurement system to transform itself through changing mental models and ingrained assumptions of its key participants towards its environment, but it also stimulates to do so continuously.

The use of the AVEM as a theoretical framework to evaluate collective learning in LEPs to achieve contracted whole-life performance requirements of the underlying assets can be a good basis upon which to analyse the quality of complex strategic PPP procurement in a more systematic way. This is based on the assumption that all participants perform to the highest standards within their particular areas of expertise and responsibility. This was explored and debated in detail in sections 7.6 and 7.7. Everyone involved in the partnership (leaders, client representatives, senior managers, middle management, and blue-collar staff) should embrace a culture of learning in order to achieve performance improvement from collective learning. If such commitment is shown or revealed to be missing through the results of using the AVEM, then management action can be taken to rectify or resolve the deficiency found.

Results from LEPs show that this requires discipline and unity with the key participants and the individual teams that deliver projects through the LEPs. By embedding the steps of the AVEM learning framework in management routines and day-to-day activities of LEPs, the act of collective learning naturally becomes part of the job. Like exercising a military drill in an army battalion or daily 'site-box' safety talks, the repetition effect of the training creates a united front where individual soldiers or site operatives can take collective action without much effort. Like in the army, this may prove to be tough at the start, but participants in LEPs that continue to give importance to the mechanisms that are there to allow learning to take place have the support of tools and technology.

11.3 Methodological contribution – QFD as an evaluation tool in PPPs

Within the mixed methods repertoire used in this research, Quality Function Deployment (QFD) has been found to be a helpful toolkit in processing the qualitative data arising from the questionnaires and interviews. The standard QFD toolkit has been adapted for the purpose of application in this research to improve its usefulness and this therefore leads to two contributions:

- For the first time, QFD was adopted in the context of PPPs, covering procurement stages DBMO. Existing QFD tools only cover a single stage: briefing, design, delivery or operation. The revised QFD tool (renamed Asset Value QFD) can now cover design, delivery and operation combined. Originally derived from theory in TQM (section 6.8.2), QFD was chosen to analyse the predominantly qualitative LEP interview survey data gathered through semi-structured questionnaires.

  To observe to what extent collective observations and learning points change due to the long-term nature of LEPs, recurrent and longitudinal use of the Asset Value QFD matrix and the associated software tool supported the derivation of insights in changes of collective positions and attitudes of key participants, such as public clients, private investors, and supply chain organisations collaborating in LEPs over time.

- QFD has also been used for the first time as an evaluation tool (using ex-post data), to allow LEP participants to take informed decisions based on collective learning from the past. Prior to this research, it was adopted as a briefing tool (using ex-ante data), as was discussed in section 6.8.4 on page 159.

  Some updates were made to the Asset Value QFD matrix and software code to make it suitable as an evaluation tool during multiple procurement stages, since it was originally developed and implemented to suit as a briefing tool, at the initiation phase of projects (section 6.8.7 on p. 166). The revised QFD software was validated by the original model developer in October 2015 (section 6.9 on p. 167).

11.4 Achieving whole-life asset value criteria in LEP-built schools

Reflecting on the appraisals of LEP-built schools, the following conclusions are drawn in response to research objective 1:

- It is possible to source from standard strategic PPP procurement policy documents a set of asset performance criteria, and apportion these to procurement stages: DBMO. The SPA includes a schedule of standard KPIs as shown in section 8.2. These can be used to appraise the whole-life VfM and environmental sustainability performance combined of LEP-built schools, as long as it is possible to access the data sources.

- The MCAs show that LEP-built schools perform reasonably well against asset value criteria at each procurement stage in isolation. Net effect ratios are calculated as a percentage of the number of schools that meet contracted criteria set against the total sample, after correcting for errors and missing entries in data. A ratio over 50% is considered high because it indicates that more than half of the net sample of LEP-built schools achieve an asset value criterion. Net effect ratios exceed 50% in most cases at single procurement stages for VfM criteria (Table 8-6); however, results for sustainability criteria are mixed (Table 8-7). When filtering schools that can meet all whole-life VfM criteria combined, or all whole-life environmental sustainability criteria combined, net effect ratios drop to well below 50% which, using common-sensical standard of reasonableness, is considered low. An appraisal of all whole-life VfM and sustainability criteria combined has been considered in section 8.5.3. Net effect ratios at individual procurement stages only exceed 50% at build stage. At design, maintain or operate stages, the combined ratios are 50% or less and therefore considered low (Table 8-8 on page 216). Based on data available, 23 LEP-built schools met all combined whole-life value criteria, 18 of which are PFI schools (Figure 8-12 on page 219).

- For a programme-level appraisal of VfM and environmental sustainability criteria at individual procurement stages, the MCA results and output graphs proved to be very effective. However, when data sources are limited or quality of data is impaired, the appraisal becomes empirically less robust for an MCA exercise on whole-life asset value covering both VfM and environmental sustainability criteria combined. As a compromise, the IPD (now MSCI) Performance Framework Model model (discussed in section 9.4) is offered which allows manual selection of a limited number of procurement stages (e.g. sustainability criteria met at build and maintain stage only, instead of all stages of DBMO).

11.5 Evaluating the LEP procurement system using the AVEM

Reflecting on the collective learning from LEPs, the following conclusions are drawn in response to research objective 2:

- It is possible to explore collective judgements by key participants involved in strategic PPP procurement systems within key contract mechanisms (section 9.5.2) at the micro level of conditions stipulated and more generally by using the AVEM stages with the three areas of analysis: commitment, communication and culture (section 9.5.3). Collective judgement is diverse at each stage of the AVEM. Headlines in subsection 9.5.2.1 to 9.5.2.4 produce the specific learning opportunities and each of the collective learning points.

- Depending on the number of instances where collective learning occurred for three or more LEP disciplines (bar chart in Figure 9-10), there are higher or lower levels of collectiveness at those AVEM stages, regardless of whether LEPs are performing better or worse. Collective learning about key contract mechanisms is most pronounced at the following AVEM stages: Implementation & Management Processes (Do), Enabling Infrastructure (Check) and at Portfolio Measurement & Benchmarking (Act). More collectiveness is observed towards parties' commitment to projects (striving for levels of involvement, importance or accuracy) and less collectiveness towards aspects that influence the culture on projects (i.e. drive to achieve goals, make modifications or adherence to policies). The level of shared opinion to contract mechanisms by individual disciplines in selected LEPs is not heavily influenced by asset performance, but the type of observations made in worse-performing LEPs are clearly more critical and negative. This can also be seen by the amount of points marked red or amber in **Appendix S**. The lack of collective learning observed at the Strategic Planning & Targets (Plan) stage might be explained by the fact that BSF was cancelled.

- The ability of LEP participants to meet clients' expectations for the achievement of whole-life VfM and environmental sustainability criteria has been considered. The whole-life nature of assets demands that judgements about contract mechanisms need to be based on an evaluation of collective learning over time as projects mature and portfolios grow. Using the AVEM as a collective learning framework and the Asset Value QFD as an evaluation tool, the results show that worse-performing LEPs deliver more collective learning points than better-performing LEPs judging by asset value criteria for whole-life VfM efficiency, cost-effectiveness and by collaboration type. This is reflective of their state and the value enhancement that the AVEM can offer to operational strategic PPP procurement systems, to explain and debate at what point(s) the collective learning achieved creates an opportunity for changes to improve performance (incremental or radical), and under what circumstances any observed lack of collective learning might become a risk or disruption. This is how the AVEM allows learning in strategic PPP

procurement systems to occur in a more systematic and collective way as projects mature and portfolios grow, to avoid any danger gaps (as marked with flashes in the AVEM).

- Collective learning over time appears to occur most at the AVEM stages: Implementation & Management Processes (Do) and at Portfolio Measurement & Benchmarking (Act). A collective learning curve effect can be demonstrated over time, encouraging organisations and individuals involved in strategic PPP procurement systems to gradually improve and perform better in the absence of competitive forces in the supply chain. The most critical collective learning points and observations made by LEP participants over time, regardless of whether performance of the underlying assets is better or worse, is very diverse. These can be found in section 9.6 and **Appendix U1**.

11.6 Contributions to policy and practice

The following contributions are made for policymakers and practitioners:

- Taking a system-oriented perspective to BSF as a policy, application of a device or similar protocol akin to the AVEM would appear to be justified as such policies demand increasing levels of functional dependency and component complexity associated with environmental sustainability criteria (Badi, 2017; Badi and Pryke, 2016; Dasgupta et al., 2012; Godoy-Shimizu et al., 2011; Moncaster and Simmons, 2015) and VfM aspects (Ive et al., 2015; Mahony and Hextall, 2013; Mahony et al., 2011; Shaoul et al., 2013; Shaoul et al., 2010). The AVEM has resulted from the investigation into the case of BSF LEPs and its application could support policymakers to develop new legislation for complex procurement systems, to think about ways to more effectively articulate the value of integrated business models, and in doing so incentivise a more systematic approach to procuring complex performance and collective learning over time.

- This research is supportive of what is often referred to as ‘evidence-based policy’, where VfM and environmental sustainability are posited to be only achievable when thinking, measuring, assessing, acting and learning about social infrastructure as whole-life assets (the operational and the environmental). Insights from this research on LEPs could also be relevant to other sectors with a similar research programme; for example, England’s healthcare sector where a similar type of model is applied (LIFT), or in Scotland where the government has adopted a similar model (hub). Also, it might be relevant in the EU, where the EFSI encourages pooled or portfolio PPP/PFI procurement, and globally similar research might assist policymakers in those countries considering the use of strategic PPP procurement systems.

11.7 Limitations of the study

A number of limitations have emerged from the research study:

- This research study appraised the effects of outputs from schools (asset value criteria); however, any benefits and outcomes (such as education attainment or local employment) are excluded from the analyses. BSF did have targets for these aspects but primarily it was a building programme.

- The period between different government programmes (e.g. BSF and PSBP) was disruptive itself to allow continuous learning. Only those LEPs that had contracts signed before BSF was cancelled were analysed because these had secured and already delivered most of their original pipeline of projects.

- A methodological limitation of QFD is that it prioritises the most frequently raised points, which draws attention to those at the top of the list. At the bottom of the QFD output reports, there are many observations and learning points from individual LEP participants with weak or no relationship strength at all because those individuals articulated unique, different or conflicting observations about value measures and/or complexities of performance conditions within contract mechanisms. These views are still worthwhile as they might hold those important lessons from individual participants in LEPs that nobody else could come up with. The idiosyncratic nature of infrastructure means that such views should not be discounted. A different research method such as case studies or ethnography using observations and extended fieldwork may need to be considered to identify and analyse those learning points less frequently raised.

11.8 Recommendations

Recommendations are split by those for further academic study and those for policy making and practice. There is no specific order of importance given to any of the priority areas identified below.

Recommendations for further academic study

- Further academic study is needed to explore whether the AVEM can be extended as a conceptual learning framework for other types of strategic procurement systems that deliver portfolios of integrated projects. These might include systems from other sectors (e.g. health, defence or agriculture) or types of assets other than infrastructure (e.g. real estate, retail, manufacturing or ICT).

- Further research in the domain of systems thinking as an approach to diagnosing project complexity is needed, especially in the built asset industry. The notion of systems thinking is not yet well embedded within the built asset industry, as was the case with BSF. As we enter the age of interdependence, where digitally based and data-driven technologies

(robotics, 3D printing, internet of things, and off-site manufacturing and assembly) become the norm rather than the exception, where parties have to rely more on big data, artificial intelligence and machine learning, and where data protection and security are paramount, it is no surprise that issues become too complex to handle, accountabilities become vague, and people risk losing control.

- Further academic study is needed about risks, (in)practicalities and unlocking potential of collective learning from data in a PPP context. The built environment industry to a large extent has only adapted slowly and cautiously to the use of new tools and technologies. With the prospect of a high-tech and highly data-driven built environment, the notion of collective learning from PPP data should appeal to and benefit both public and private participants. However, it appears that within a PPP environment (which itself is a private business), participating organisations remain highly protective about disclosing their intellectual and commercial property, as was the case with LEPs.

- An assumption that requires further research is how the AVEM can be extended as a generic collective learning framework for strategic procurement systems (comprising a project portfolio) beyond that of the case of social infrastructure. Expanding into the domain of general portfolio management requires further research.

Recommendations for policy and practice

- Policy-led longitudinal research is needed in the long-term outputs, outcomes and benefits of social infrastructure, especially schools, by comparing multiple procurement options and different investment types across whole asset life criteria. In 2010, the then coalition government decided to make immediate savings by cancelling BSF, but the long-term effects on BSF investment could only be assessed after 10 to 15 years. This was also acknowledged in the DfE Review of Education Capital (James, 2011). Bearing in mind that teaching methods and people's perceptions will change, BSF was designed to be flexible. The asset-level data analyses of this research study affirm the assertion made in the James Review that BSF buildings have a higher initial capital cost, but the quality level is high and more durable which is reflected in the vast majority of these schools meeting asset value criteria for hard FM, soft FM and energy costs, as shown in Figure 8-5.

- Contractual incentives are needed for collective learning. The ability of the participants in LEPs to meet contract requirements in relation to the achievement of VfM and environmental sustainability criteria during a long-term strategic PPP very much depends on all participants being incentivised to engage in collective learning. This will allow them to perform to the highest standards within their particular areas of expertise and responsibility. The AVEM could be introduced for policy and practice to explain and debate at what point(s) the collective learning achieved in a strategic partnership structure creates an opportunity for changes (incremental or radical), and under what circumstances any observed lack of collective learning becomes disruptive.

11.9 Reflexivity

In this section, the author attempts to reflect upon his role as researcher, his previous personal and professional experiences, pre-study beliefs and any pre-conceptions that could have influenced the research process.

The PhD research commenced in September 2010, just after BSF was cancelled. The author does not take any political stance but has included summaries of the various political viewpoints in this thesis. The author takes on board the widespread and severe criticism both before and after the BSF programme was terminated. The research analyses strategic PPP procurement systems. It takes the case of LEPs because much of the knowledge and intellect that was available at the time of the data collection until summer 2015 disappeared rapidly as LEPs were closing down and people moved on in the industry. Hence, the timing and relevance to capture the learning was a unique possibility that cannot be repeated.

The author both studied and practised in LEPs for four years prior to commencing the PhD research study and continued to do so until the date of this thesis. Combining a profession as LEP and SPV general manager and later as director with research created benefits but also some drawbacks. A main benefit is that research findings are related directly to the work environment and vice versa. This also helped when theorising the central argument. The main disadvantage is the lack of time available. However, the constant interchanges of work and research that are in the same field (but not related) allow the author to improve continuously, critique the work and have ongoing milestones to seek visions and reflections with others.

The author was also engaged in a preceding MSc thesis titled ‘Partnering and Performance in BSF Projects’ that was conducted in 2006. As the BSF programme was launched from 2003 to 2004, at that time the first four BSF projects had only reached the status of preferred bidder, but still needed to work up to financial close. At that time, no LEP had been set up. Consequently, the findings from the MSc research were mainly prospective (Vermeer, 2006). While the survey questionnaire that was used to collect data for the MSc thesis and QFD as a tool to analyse the data are based on similar principles to that used for this PhD research, the data that was generated could not be incorporated due to refinements to a number of questions and to the QFD software.

The reflective nature of this research study was a unique opportunity to analyse the learning from LEPs as real-life examples of complex strategic PPP procurement systems. The majority of them nearly completed their pipeline of projects, meaning that access to key LEP participants and their intellectual knowledge was slowly diminishing with the demise of BSF. The large amount of information received has enabled the author to make a real and timely contribution to the ongoing scientific debate about the systematic way in which organisations involved in strategic PPP procurement systems for social infrastructure can learn collectively and how this affects output performance in terms of delivering whole-life asset value.

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Appendix

A

LIST OF DEFINITIONS

APPENDIX A – LIST OF DEFINITIONS

Most of the definitions are explained in the context of the legacy BSF policy and its standard documentation between 2003 and 2010, in particular those in connection with the Strategic Partnering Agreement.

- # -

21st century facilities: If schools are to provide excellent educational facilities for generations to come, designs for new and refurbished school buildings need to take account of current and likely future developments in education and technology, as well as the local and global environment. Short-term flexibility and longer-term adaptability are both key requirements, as are buildings that will inspire new ways of learning and provide excellent facilities to benefit the whole community. Recent research shows that well-designed schools lead to to greater engagement, higher motivation and educational attainment. (4ps and PfS, 2008)

- A -

Academies: Academies are all ability independent schools established by sponsors from business, faith or voluntary groups working in partnership with central government and local education partners (4ps and PfS, 2008).

Affordable: means within the revenue resource parameters determined by the Local Authority and notified in writing to the LEP for a proposed New Project (PfS, 2008c).

Affordability Gap: The difference between total estimated cash flow requirements for building and managing the BSF project and the total available funding for schools covered under the BSF programme (4ps and PfS, 2008).

Asset Management Plan (AMP): The Local Authority's capital investment strategy for its school estate (or indeed all council buildings) which provides an assessment of building condition, the suitability for purpose, and sufficiency (4ps and PfS, 2008).

- B -

BB98 and BB77: BB98 (Building Bulletin 98, Briefing Framework for Secondary School Projects) is a DCSF document which sets out area guidelines for secondary school buildings and grounds (including Academies). It also includes guidance on how schools and Local Authorities should develop the brief for any secondary school and the design criteria that must be considered. BB77 (Building Bulletin 77, Designing for Pupils with Special Educational Needs and Disabilities in Schools) contains information on accessibility, inclusion and designing for pupils with special education needs in mainstream and special schools (4ps and PfS, 2008).

Best Value: The optimum mix of benefits and sacrifices in the view of the decision maker. This may range from the lowest life-cycle cost achievable for a standard benefit package to the most benefits available for the resources allocated (Saxon, 2005).

Building Schools for the Future (BSF): The aim of the BSF programme was to see every state secondary school in England - around 3,500 in total - rebuilt or remodelled over the lifetime of the programme. Launched by the Department in February 2004, BSF was the largest and most ambitious scheme of its kind anywhere in the world. It aimed to transform education for some 3.3 million students aged 11-19 (James, 2011).

The scale of BSF allows the opportunity to move from patch and mend spending on schools to rebuild and renewal, with a more strategic approach to funding, design, and procurement of buildings. As a building programme aimed at improving learning environments, BSF funding allocations will address whole areas, demanding profound reshaping of local educational visions. Local authorities and communities will be guided by government education policy, taking into account what is required today and can be adapted for future needs. The targets of BSF are to:

- rebuild or renew facilities for all secondary pupils in England within 10 - 15 years from 2005-06;
- provide flexible, inclusive spaces that accommodate ICT provision;
- enable application of the government's "14-19 agenda" including personalised learning;
- support workforce reform;
- be high quality, safe and secure, allowing staff to concentrate on their role as educators.

(BSF, www.bsf.gov.uk, visited: 20th February 2010)

Building Schools for the Future Investments LLP (BSFI): The vehicle set up by DCSF and PUK to work with PfS to invest in the BSF programme. BSFI was privatised in 2011 with a sale to INPP (4ps and PfS, 2008; BSFI, 2011).

BREEAM: Assesses the performance of buildings in the following areas - management, energy use, health and well-being, pollution, transport, land use, materials, and water. Schools in BSF were required to meet or exceed the BREEAM 'very good' standard (James, 2011).

- C -

Capital expenditure: The capital value is the total funding requirement for a project as at the date of financial close of individual contracts. It reflects the aggregate debt and equity finance in a project, plus any capital contributions made by the public sector (HM Treasury PFI Projects List, 2014).

Commission for Architecture and the Built Environment (CABE): A national body promoting good design of buildings and spaces. Advisory body to the BSF programme in design issues funded by DCSF to support LAs with design enablers, providing 10 – 12 days of free time allocated to each Local Authority project, previously to the schools PFI programme, and to BSF authorities (4ps and PfS, 2008). CABE was abandoned in 2011.

Competitive Dialogue: The procurement process used by the public sector for the award of complex contracts such as those for the Private Finance Initiative (PFI). This procedure was introduced by the EU and became part of English law in January 2006 (4ps and PfS, 2008).

- D -

Department: The government department with responsibility for education and schools. This is currently the Department for Education and formerly the Department for Children, Schools and Families and Department for Education and Skills (James, 2011).

Design and Build: Using a single contractor to act as the sole point of responsibility to a public sector client for the design, management and delivery of a construction project on time, within budget (taking account of whole-life costs) and in accordance with a pre-defined output specification using reasonable skill and care (OGC, 2003b).

Design Quality Indicators: The Design Quality Indicator (DQI) is a process for evaluating the design quality of buildings. A DQI specifically for schools has been developed for BSF. It measures design quality according to three criteria:

- Functionality: The building should provide access for all and space for both teaching and non-teaching activities, and should adapt to changing needs.
- Build quality: The building's finishes should be durable; design should minimise the requirements for mechanical ventilation (cooling and heating) and the layout, structure and engineering systems should be well integrated, using sustainable materials and systems.
- Impact: The building should be well sited and display character and innovation; forms and materials should be well detailed; and the facility should contain pleasant circulation spaces, common areas and natural light.

DQI evaluations were repeated to ensure that design quality is maintained at all stages throughout the project. PfS would ensure the DQI is completed at required stages, and may offer facilitation (4ps and PfS, 2008).

- E -

Economic infrastructure: The networks and systems in energy, transport, digital communication, flood protection, water and waste management. These are all critical to support economic growth through the expansion of private sector businesses across all regions and industries, to enable competitiveness and to improve the quality of life of everyone in the UK (HM Treasury, 2010).

Empirical research: Studies based on the collection and presentation of original evidence or data in support of a study's claims. The evidence or data should be amenable to tests of credibility—that is, through the open inspection of the sources and procedures by which the evidence or data were produced (Yin, 2010).

Energy Service Companies (ESCos): Organisations and businesses that reduce energy consumption through investment and maintenance of efficient plant and fabric in buildings, and through active monitoring and management of performance. The services provided can be wide ranging, from roof insulation and low energy lighting systems to large projects such as full heating installations (James, 2011).

- F -

Facilities Management (FM): the combination of building maintenance and operational services (BSFI, 2011).

- G -

Gateway Review: A Gateway is a review of a procurement project carried out at key decision points by a team of experienced people who are independent of the project team. The Gateway Review process provides assurance to the Project Owner that their project can progress successfully to the next stage. Gateways have been designed to support projects that procure services, construction/property projects and IT enabled business change projects. The Gateway Review process in Local Government is managed by 4ps (4ps and PfS, 2008).

- H -

Hard FM Services: means the maintenance and operational services provided in relation to a facility which becomes an Approved Project but excluding any Soft FM services (PfS, 2008c).

- I -

ICT Managed Service: A managed ICT service is the hardware and software that provides networked computing, allowing pupils and teachers to use learning software and manage pupil data. Everything to be provided through the managed service is captured in a contract with a specialist provider (usually part of the LEP). A carefully specified and procured managed ICT service will allow schools to get on with their core business and not be distracted by technical problems. A good managed service should allow ICT to be seen as a “fifth utility” (4ps and PfS, 2008).

Infrastructure: Infrastructure has been understood in many ways and encompass many different aspect, and a universally accepted definition has remained elusive. A number of wider definitions of infrastructure are set out below.

The sum of all material, institutional and personal assets, facilities and conditions available to an economy based on the division of labour and its individual economic units that contributes to realising the assimilation of factor remuneration, given an expedient allocation of resources.

The term material infrastructure stands for the sum of all physical assets, equipment and facilities and the term institutional infrastructure points to the norms and rules, which develop and are set in a society over time; in addition, the term personal infrastructure is used to encompass a number of qualities of people in the market economy (Jochimsen, 1966).

The basic physical and organisational structures and facilities (e.g. buildings, roads, power supplies) needed for the operation of a society or enterprise (www.oxforddictionaries.com, September 2014).

Infrastructure is basic physical and organisational structures needed for the operation of a society or enterprise or reproductive system, or the services and facilities necessary for an economy to function. It can be generally defined as the set of interconnected structural elements that provide framework supporting an entire structure of development... The term typically refers to the technical structures that support a society, such as roads, bridges, water supply, sewers, electrical grids, telecommunications, and so forth, and can be defined as "the physical components of interrelated systems providing commodities and services essential to enable, sustain, or enhance societal living conditions". Viewed functionally, infrastructure facilitates the production of goods and services, and also the distribution of finished products to markets, as well as basic social services such as schools and hospitals... (Wikipedia, September 2014)

The national infrastructure comprises networks, systems, sites, facilities and businesses that deliver goods and services to citizens, and support our economy, environment and social well-being. Within the national infrastructure, nine sectors have been identified as providing essential services upon which daily life in the UK depends. The 9 sectors are: food, energy, water, communications, transport, health, emergency services, government, and finance. (Cabinet Office, Keeping the Country Running: Natural Hazards and Infrastructure, UK, 2011)

The infrastructure supporting human activities included complex and interrelated physical, social, economic, and technological systems such as transportation and energy production and distribution; water resources management; waste management; facilities supporting urban and rural communities; communications; sustainable resources development; and environmental protection (American Society of Civil Engineers, 2009).

Physical components of interrelated systems providing commodities and services essential to enable, sustain, or enhance societal living conditions (Fulmer, J.E., In: Infrastructure Investor, PEI Media, July/August 2009).

Infrastructure assets are long-lived capital assets that normally can be preserved for a significantly greater number of years than most capital assets and are normally stationary in nature. Examples of infrastructure include roads, bridges, tunnels, drainage systems, water and sewer system, dams and lighting systems (National Cooperative Highway Research

Program, GASB 34-Methods for condition assessment and preservation, Report 608, Transportation Research Board, Washington D.C, 2009).

Infrastructure assets are physical facilities that provide essential public services as required by the economic and social needs of the public (Uddin, W., Hudson, W.R. & R. Haas, Public Infrastructure Asset Management (2nd edition), McGraw-Hill, 2013).

The basic physical systems of a business or nation. Transportation, communication, sewage, water and electric systems are all examples of infrastructure. These systems tend to be high-cost investments, however, they are vital to a country's economic development and prosperity. Infrastructure projects may be funded publicly, privately or through public-private partnerships. (Investopedia, September 2014)

…basic systems that bridge distance and bring productive inputs together; that bring materials, products, equipment, information, and people together; and that in fundamental ways bring all the critical factors of productivity to bear across time and space (Cisneros, H., America's Essential Infrastructure - A key to competitiveness, in The Handbook of Infrastructure Investing, Wiley, 2010).

- J -

Joint Ventures: partnerships in which public and private sector partners pool their assets, finance and expertise under joint management, so as to deliver long term growth in value for both partners (HM Treasury, 2000).

- K -

Key Performance Indicator (KPI): In BSF, the KPIs measure the ongoing performance of a contract, they are extensively used in the Strategic Partnering Agreement (4ps and PfS, 2008).

- L -

Local Education Partnership: The LEP is a company that will provide long-term partnering services for the Local Authority so that the aims of BSF can be delivered. It is a joint venture company comprising the Local Authority, BSFI and a private sector partner. The relationships between stakeholders, the Local Authority and the LEP are summarised in the diagram opposite (summarising overview and PFI interface). The Local Authority has a contract with the LEP called the Strategic Partnering Agreement, which gives exclusive rights to the LEP to deliver projects for a fixed period, likely to be 10 years. The Local Authority, in its role as client and commissioner, will formally consult stakeholders (including schools) through the Strategic Partnering Board (4ps and PfS, 2008).

- M -

Modernised schools are defined as:

- new schools built / rebuilt since 1997-98 (i.e. completed after 1 April 1997);
- those which have had a cumulative 80% or more of the total floor area of the resultant school building replaced or refurbished (including any additional buildings) since 1997-98 as a result of LA / school investment; and/or
- those which are due to have had a cumulative 80% or more of the total floor area of the resultant school building replaced or refurbished (including any additional buildings) by September 2009 as a result of LA / school investment;
- those which have received investment through BSF;
- New or refurbished Primary Capital Programme pathfinder schools opened.

(PfS School Building Survey, 2011)

- N -

Net effect ratio: A net effect ratio in the context of this research is calculated as a percentage of the number of schools that meet contracted criteria set against the total sample, after correction for any errors and missing data. Ratios are important to better understand if LEP-built schools can meet the requirement to be both Value for Money and environmentally sustainable during the full asset life. A ratio over 50% is considered high because it indicates that more than half of the net sample of LEP-built schools achieve an asset value criterion (or combined criteria). Reversely, a ratio below 50% is considered low.

- O -

One school pathfinder: Local Authorities that were not due to start the full BSF programme until waves 10 to 15 have been awarded One School Pathfinder status; projects for a single new school funded by BSF capital (4ps and PfS, 2008).

Outline Business Case (OBC): The OBC is detailed assessment of what is achievable and affordable in BSF. It provides sufficient detail to secure formal approval to begin the procurement of a private sector partner. The OBC aims to ensure that projects are sufficiently robust to move into procurement, and in particular, that they are:

- affordable,
- offer value for money,
- will be attractive to the market,
- have the necessary Local Authority resources and experience in place.

The Outline Business Case sets out in detail the scope, costs, affordability, risks, procurement route and timetable of the project such that it can be approved by the Local Authority to the satisfaction of DCSF and the Project Review Group (if PFI included), and for advancing to the procurement stages of the project. The OBC is written using guidance provided by PfS (4ps and PfS, 2008).

Output Specification: A detailed description of the functions that the new accommodation must be capable of performing. Usually split into building functions and service functions. The Output Specification is intended to state only the outputs required of the services, and not the way in which the PSP will achieve these (4ps and PfS, 2008).

- P -

Partnering Services: means the services (other than Project Services) to be delivered by the LEP under this Agreement as required pursuant to the Partnering Services Specification in Schedule 12 and the other provisions of the SPA (PfS, 2008c).

Partnerships for Schools (PfS): The non-departmental public body (NDPB) set up to deliver BSF, working at both a national and local level. It is separate to BSFI, the investment vehicle. PfS was also tasked with delivering the government's Academies programme (4ps and PfS, 2008). PfS focussed on two main streams of activity:

- development and management of the national BSF programme;
- development and management of the local projects, including:
  - challenging LA's in defining their educational strategy and how they will use the investment opportunities of BSF to achieve local transformation in educational performance
  - assisting LA's to select their LA with which they will establish a LEP which will deliver the transformation.

On a day-to-day level, PfS acted as:

- assistant and provider of support to the procurement team in each LA;
- evaluator and co-selector of the private sector;
- provider in each LEP;
- ongoing supporter to LA's once LEP's have been established;
- a support function to the BSF team in DfES.

(Partnerships for Schools, www.p4s.org.uk, visited: 28th August 2010)

Partnerships UK (PUK): was formed in 2000 out of HM Treasury, is a joint venture that bridges the gap between the public and private sectors, with a majority stake held by the private sector. PUK offers a blend of public and private sector commercial expertise combined with hands-on experience in the development and delivery of numerous PFI and other Public Private Partnership (PPP) projects.

Pathfinder project: Four projects selected in March 2003 to help shape and prove the BSF programme and which are currently progressing through the project stages. The Pathfinder projects should remain slightly ahead of the main wave 1 projects and will provide valuable information on the processes (PfS, 2004b).

PFI project: Construction projects are undertaken by the private sector, who are incentivised by having private finance at risk, and have asset ownership for the duration of the contract; ongoing maintenance and operation are also provided by the private sector in PFI

arrangements, with government (revenue budget) or users charged for the service provision (OGC, 2003b).

PfS Team: The PfS team consists of four teams. The Education & Planning team ensures that Local Authorities will develop robust education visions. These visions are fortified by ICT strategy, government policy and the delivering of educational transformation. The Policy & Programme team consists of national programme managers who take care of the money allocated to BSF. They are also responsible for ensuring that value for money is achieved from their resources and meet with the BSF policy objectives. The team has knowledge managers to create cost and quality information systems so that all projects can be captured, stored and analysed so that best practice can be notified. The design managers ensure that plans from Local Authorities are feasible and that contractors the most fit-for-purpose from the funding available. Transaction & Finance team provides guidance and operational support to Local Authorities in the procurement phase of the BSF programme. The team also controls nationally the standard procurement documents and the legal and commercial documents in relation to Local Education Partnerships (LEP). Finally the Communications team develops ways to share best practice amongst Local Authorities and bidders (Partnerships for Schools, www.p4s.org.uk, visited 20th February 2010).

Prime Contracting: Using a single contractor to act as the sole point of responsibility to a public sector client for the management and delivery of a construction project on time, within budget (defined over the lifetime of the project) and fit for the purpose for which it was intended, including demonstrating during the initial period of operation that operating cost and performance parameters can be met in accordance with a pre-agreed cost model (OGC, 2003b).

Private Finance Initiative (PFI): is an integrated procurement route where the public sector contracts to purchase quality services, with defined outputs from the private sector on long-term basis and including maintaining or constructing the necessary infrastructure so as to take advantage of private sector management by having private finance at risk (OGC, 2003b).

Private Sector Partner: The private sector organisation with which a Local Authority enters into a PPP or PFI contract. In BSF, the PSP will have the majority stake within the LEP, and may also be in direct contract with the Local Authority through PFI contracts. The PSP is usually a consortium made up of a range of private sector companies working collaboratively. These might include Construction Companies, ICT Providers, Legal Advisors and Education Consultants. The PSP means the LEP and its supply chain in the context of this research (4ps and PfS, 2008).

Project Initiation Document (PID): Defines the BSF project in order to form the basis for the management and assessment of the success of the project. It provides a framework for the Project Board and the Project Manager to assess progress, change management and ongoing viability (4ps, 2005).

Project Review Group (PRG): The PRG is an inter-departmental group chaired by HM Treasury, with members drawn from the sponsoring government departments (ODPM, HM Treasury, DfES, etc). The PRG assesses PFI projects to confirm the commercial viability of proposals, prior to commencing procurement. The PRG will assess all projects in BSF with a PFI element (PfS, 2004b).

Project Services: means services required to be provided under or in connection with a Project Agreement in relation to the design, construction, commissioning and completion of premises, provision of hard FM, soft FM and ICT services (PfS, 2008c).

Public Private Partnership (PPP): brings public and private sectors together in long term partnership for mutual benefit. The PPP label covers a wide range of different types of partnership, including: private sector ownership in state owned businesses, PFI and the franchising of government services into wider markets (HM Treasury, 2000).

- R -

Refinancing: Once building work is complete the 'risk' in the project diminishes and the SPV is able to negotiate more favourable financial terms with their lenders, which result in financial gain. Standard PFI contract terms now state that any such financial gain will be shared between the public and private sector partners. It is usually shared on a 50/50 basis (4ps and PfS, 2008).

Reflexivity: The dynamic interplay whereby participants (i.e., those being studied) may be influenced by the presence and actions of the researcher, and conversely the influence on the researcher's thinking and observations resulting from the presence and actions of the participants (Yin, 2010).

Refurbishment: is defined as follows:

- building structure, floors, walls, ceilings, roofs and openings, are in or have been brought to a good state, so that no significant work is required over the next few years and;
- mechanical and electrical plant, fixtures and fittings are in or have been brought to a good state, so that no significant work is required over the next few years.

(PfS School Building Survey, 2011)

Research lens: The mental filter present in all qualitative research, affecting researchers' interpretations of the field-based data that will later be reported in a qualitative study (Yin, 2010).

- S -

Sample schemes: small number of schools are chosen by the Local Authority as a cross-section of the type of schools the LEP will aim to deliver. Designs are developed during the procurement process and form a significant part of the evaluation process to select the Private Sector Partner. Sample schemes are normally limited to two - one new build school and one remodelled/refurbished school. Subsequent schools will be designed and delivered by the LEP after the award of the contract (4ps and PfS, 2008).

Secondary PFI market: As PFI projects move into the operational phase with building works completed, a secondary market may develop which will involve investors in the original project SPV selling their shares in the SPV to financial investors who are attracted by the potential return on investment available over the remaining term of the project (4ps and PfS, 2008).

Social Infrastructure: Also referred to in some countries as public real estate, that is, public facilities such as schools, hospitals, administrative buildings, cultural houses, social housing, sports halls and arenas, public pools and so on (Weber and Alfen, 2010).

Social infrastructures produce services that enter indirectly as common inputs to many industries. As is the case with economic infrastructure, investment in social infrastructure sectors is likely to be suboptimal in the absence of government intervention due to the presence of pervasive market failures (Wagenvoort et al., 2010).

Social infrastructure can be broadly defined as long-term physical assets that facilitate social services – typically schools, medical facilities, state or council housing and courthouses, among others (Preqin, 2014)

Social infrastructure provision is integral to the creation of sustainable communities as it contributes much of the glue that holds communities together, providing services and facilities that meet the needs of residents, promote social interaction and enhance the overall quality of life within a community. The creation of sustainable communities, which involves bringing together a lot of diverse components, has been a cornerstone of government policy for many years. The 2004 Egan review of skills for sustainable communities developed what has become a widely used tool for judging sustainable communities, often referred to as the 'Egan Wheel'.

Social infrastructure can be said to include:

- health and social care: primary care, health centres, doctors/GP surgeries, hospitals and tertiary care
- education: nursery/pre-school, primary, secondary, further and higher education, adult training
- leisure and pleasure: parks, allotments, open space, play areas, sports centres
- commercial infrastructure such as shops, cinemas, pubs and cafes
- emergency services: police, fire, ambulance
- other community and cultural infrastructure: libraries, community halls, youth clubs, arts projects, community development.

However, social infrastructure is not just about physical infrastructure. It can also embrace the provision of training and employment opportunities both in the construction phase and in the businesses and services created by the development (BPF, 2010).

Soft FM Services: means services provided in relation to a facility which becomes an Approved Project in respect of cleaning, caretaking, security, grounds maintenance and similar services (PfS, 2008c).

Special Purpose Vehicle (SPV): The company that will be established by the LEP to operate and manage individual tranches of the BSF project. Its sole purpose will be the delivery of the tranche. It will deliver the services using either PFI or traditional funding (4ps and PfS, 2008).

Standardisation of PFI Contracts (SoPC): Guidance documentation and approved drafting produced by PUK on behalf of HM Treasury, which sets out national standards for PFI contracts. The third edition was produced in 2004 and the fourth edition (SoPC4) was produced in April 2007 and is binding on all PFI-funded projects (4ps and PfS, 2008).

Strategic Collaboration: Partnering arrangements may take the form of charters or non-binding statements. The latter is the most common form of partnering seen on PFI projects. The National Audit Office recommends adopting a partnership approach to PFI projects based on a common vision of how parties work together to achieve a mutually successful outcome.

Strategic partnership: (long-term collaborative relationship) involves the integrated supply team and the client organisation working together on a series of construction projects to promote continuous improvement. Strategic partnering can deliver significant savings, of up to 30% in the cost of construction. With this kind of arrangement a contract or framework agreement is awarded to an integrated supply team for a specified period of time; the team prices individual projects within the contractual arrangement (OGC, 2003a).

Strategic Partnering Agreement (SPA): is a long-term strategic partnering relationship between the LEP and the Local Authority relating to the delivery of improved educations facilities in the area (PfS, 2008c).

Strategic Partnering Board (SPB): the main role of the SPB is to monitor and hold accountable the LEP, in particular its financial and operating performance. The SPB is made up of one representative from each of the Local Authority and the LEP, an independent non-

voting chairman and up to four stakeholder representatives such as governors, and community representatives. The board is also a forum for the exchange of ideas and further development of the SBC (4ps, 2005).

Strategy for Change (SfC): Formerly known as Strategic Business Case. The SfC is the first key document the Local Authority has to produce and agree locally. It ensures that the Local Authority's educational priorities are at the forefront of their BSF planning processes, enabling more forward-looking learning environments to be developed. School staff, governors and the local community will need to be engaged with the Local Authority's development of its strategic objectives and plans for its 'Strategy of Change'. The SfC document is in two parts. Part 1 focuses on setting out what is to be done. Part 2 focuses on how it will be achieved (4ps and PfS, 2008).

Sustainable development: This is the most commonly quoted definition and it aims to be more comprehensive than most: *"Sustainable development is development that meets the needs of the present without compromising the needs of future generations to meet their own needs"* (Brundtland, 1987).

It contains within it two key concepts:

1) The concepts of needs, in particular the essential needs of the worlds poor, to which overriding priority should be given, and:
2) The idea of limitations imposed by the state of technology and social organisation on the environments ability to meet present and future needs.

UK sustainable development organisation Forum for the Future defines sustainable development as: *"a dynamic process which enables all people to realise their potential and improve quality of life in ways which simultaneously protect and enhance the Earth's life support systems"*.

Sustainability: While the terms are often used interchangeably, 'sustainability' can be viewed as the fundamental goal, and 'sustainable development' as the path towards it. Sustainability is living with our means, learning to live comfortably with the Earth's natural environmental limits without having to sacrifice our wealth and happiness. It is 'the ability to live long term with the resources that are available to us' (College of Estate Management, 2008, p.6).

- T -

Tranche: A group of waves that fall within a specified Treasury spending review (SR) period (PfS, 2004b).

Transfer of Undertakings (Protection of Employment) regulations (TUPE): TUPE is intended to safeguard the interests of an employee if the organisation they are working for

transfers to another employer. Existing terms and conditions are automatically transferred to the new employer (4ps and PfS, 2008).

- U -

Unitary Charge: The Local Authority pays a monthly fee called the Unitary Charge to the SPV to cover its capital repayment and service delivery costs. The Unitary Charge is subject to inflation on pre-agreed indices and is subject to benchmarking (soft services costs only) at periodic intervals, usually every 5-7 years. Broadly the Local Authority knows from the start what the payments will be and can budget accordingly, as can the schools. If the quality of service provision falls below agreed performance levels, or if the accommodation is not available, the Unitary Charge will be subject to deductions as per the contract (4ps and PfS, 2008).

- V -

Value for Money (VfM): is the optimum combination of whole-life costs and quality to meet the user requirement (OGC, 2003b). It can be assessed on the level of the investment programme, the procurement level and the project level (HM Treasury, 2004b).

The definition of Value for Money has a similar meaning to Best Value but implies that only money values are significant (Saxon, 2005).

- W -

Wave: A group of BSF projects in a number of authorities with funding starting in a particular financial year (4ps and PfS, 2008). The BSF programme was introduced by 15 separate waves. A wave is a group of projects with funding starting in a particular financial year, and which then progresses through the project stages (PfS, 2004b).

Whole Life Cost: means in relation to any project, the estimated and (to the extent that such information is available) the actual cost of operating and maintaining that project over its intended design life (PfS, 2008c).

Appendix

B

LETTERS OF SUPPORT

1. Letter of DfE Education Funding Agency, 2013
2. E-mail of Amber Infrastructure, 2013
3. Letter of Partnerships for Schools, 2006

Appendix

C

BSF AND THE ECONOMICS OF THE LEP

1. Review of the original BSF policy
2. Economics of the LEP model
3. Wider criticism about BSF

APPENDIX C – BSF AND THE ECONOMICS OF THE LEP

1. Review of the original BSF policy

1.1 Introduction

In chapter 1 (Introduction) the original intentions of the BSF programme, the main areas of criticism and relevance for this research are discussed. Section 2.5 provided some further political context to BSF, explained how the programme was launched and funding prioritised.

This Appendix C turns to the original BSF policy with a brief introduction why it was developed, the structure of programme, standardised procurement process and the evaluation methods applied prior to its cancellation in 2010. The LEP model was already briefly introduced in chapter 1 and section 2.4.1. This Appendix C provides a detailed overview of BSF and the standard LEP model.

1.2 The original aims of BSF

Originally the intended roll out of BSF was launched in 2004 by DfES (2004)and PfS, who had prioritised geographical areas by need in terms of asset condition and local deprivation levels.

> *"The programme will be driven by plans generated locally – by partnerships of local education authorities, schools, governors and the wider community. Bids will be prioritised on the basis of agreed criteria, which could include educational standards, deprivation, condition of buildings, and readiness to deliver step changes in provision."* (DfES, 2003a, p. 3)

Subsequently, 'deliverability' and 'affordability' were the basis for decisions on selecting projects to enter the BSF programme. At that time, DfES and PfS had received from all Local Authorities (LAs) their expressions of interest to participate in BSF. DfES had set constraints on the deliverability of the programme within the waves:

- Funding availability and programme length;
- Handling early programme capacity and risk. Larger LAs with several high-value investment projects were limited to only one BSF project in the first three waves;
- Managing commercial capacity, in case an authority had submitted more than one project proposal the LEP had to be able to procure all proposals successfully;
- Managing market capacity to prevent unacceptable low competitive pressure on regional capacity and construction market;
- Smaller projects below £50m were grouped with larger projects so that LEPs had a continuity of business. Large projects were proposals of more than £200m;
- Phasing the projects of the largest Authorities over different waves;
- Starting with areas of highest need.

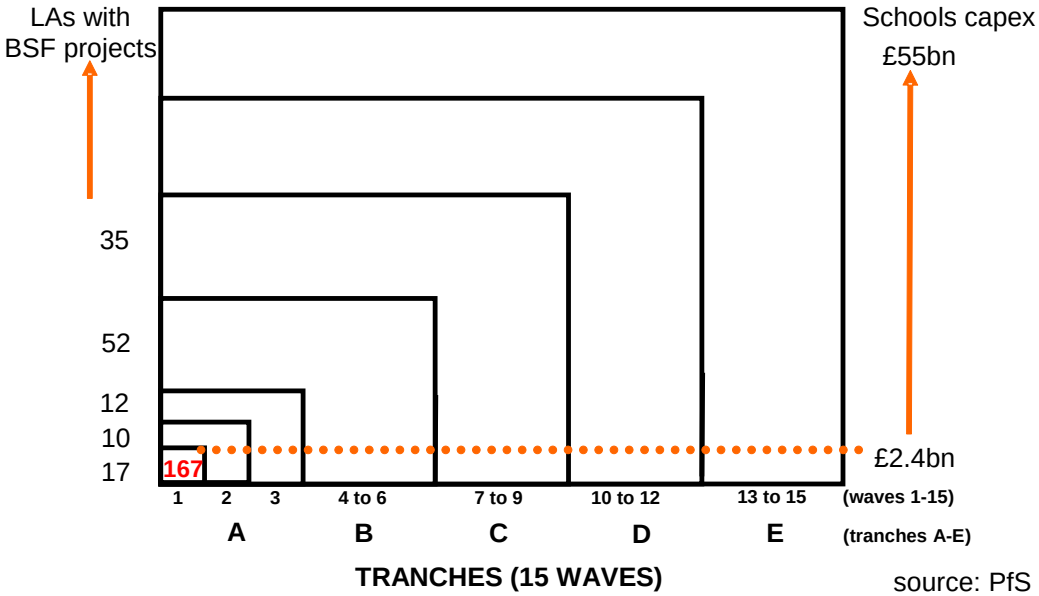
DfES had also set out funding principles to demonstrate the affordability of the programme:

- Up to half of the secondary schools (50% of gross floor area) would be brand new;
- An appropriate mix of school sizes, including schools-in-schools where it made sense;
- LAs should reinvest any capital receipts into their projects;
- There was a presumption against investments built or rebuilt in the last 15 years;
- There was a presumption against supporting exceptional abnormal costs;
- LAs were responsible for joining up funding where other services (e.g. health or leisure) were to be delivered as part of BSF projects;
- FM contracts of PFI contracts should be replicated and made appropriate for conventionally funded schools and maintenance of ICT services;
- There would be a strong drive for efficiency across the programme.

The size and timescales of the original programme were very challenging, it targeted 3,500 schools to be delivered within 15 annual 'waves' of investment from 2005-06. According to DfES and PfS at the time the BSF programme was affordable both nationally and locally.

1.3 Structural BSF process

The BSF programme was to be introduced by 15 separate 'waves' from 2004 until 2016. The first three waves of projects were confirmed with great fanfare in November 2004. About £2.4bn became available in 2005-06 for the projects in wave one. The 15 waves were to be equally separated into a number of tranches: A to E (as per Figure 1 below). Each tranche consisted of three waves. Information about future tranches and waves was very indicative.



source: PfS (2006b)

Figure 1: Programme separated into waves and tranches

The data in Figure 1 are based upon the PfS score sheets that were historically published on the PfS website to give a snapshot status overview of how BSF was progressing nationally. On the left hand axis, the Figure shows the number of LAs to be engaged in BSF divided into waves and tranches of projects on the horizontal axis. Each tranche would comprise a number of waves of investment in schools. As can be observed from the Figure, some 39 LAs were to

be involved in Tranche A, i.e. the first three waves with BSF projects. The dotted line shows that £2.4bn of capital expenditure was allocated for the investment in wave 1 projects, comprising 167 secondary schools. As BSF progressed through the waves, the amount of capital expenditure (right hand axis) would potentially accumulate up to £55bn. Until BSF was terminated in 2010, PfS was committed to provide as much future certainty as possible about future investment possibilities. The actual detail would only emerge over the years as the programme evolved, and this was subject to:

1. Future public spending decisions;
2. Refinements to BSF policy aims;
3. Updating data for prioritised areas;
4. Adjustments to the BSF programme from lessons learnt from previous waves;
5. Changes in plans, priorities and local circumstances.

1.4 Procurement process of a LEP

All stages are summarised in the Figure 2 below (4ps and PfS, 2008). The standard BSF project stages are further clarified in detail in **Appendix E1**. They relate to the procurement of both LEP and its initial projects. The original intention was that the development of subsequent projects would accelerate due to the existence of LEPs and the availability of benchmark data when more projects are developed. Having this data was a national policy objective of BSF.

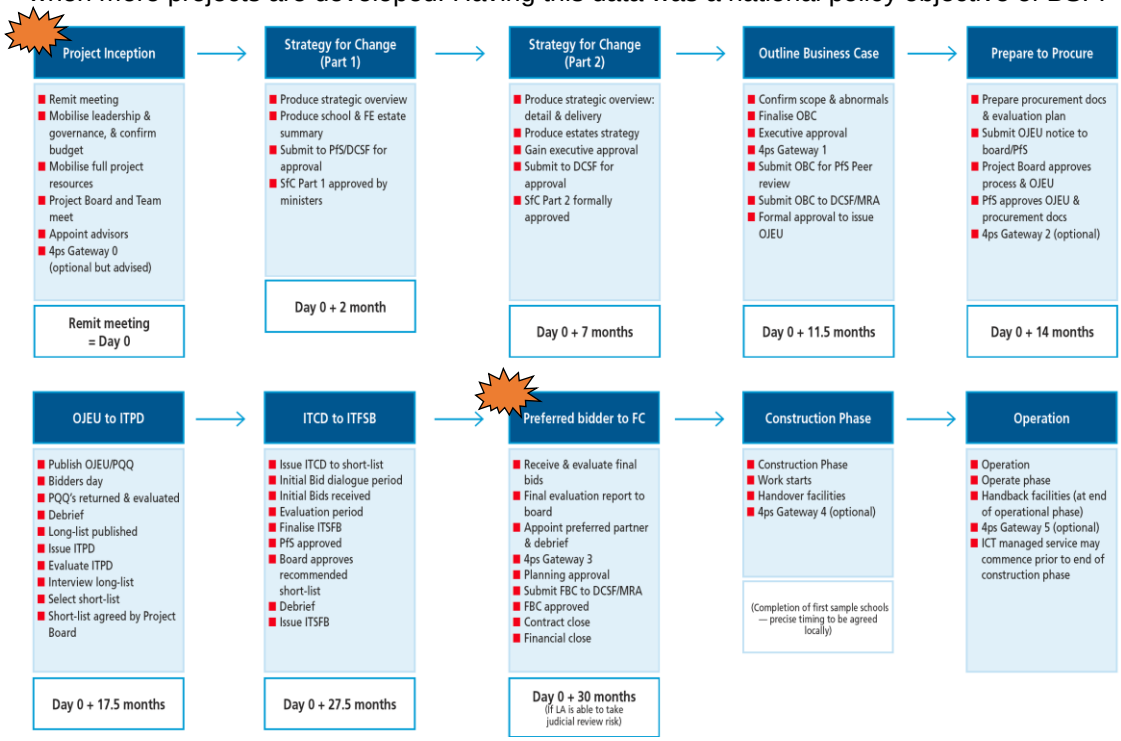


Figure 2: Standard BSF project process and timescales

The marked stars in Figure 2 show when a project or wave of projects is announced and when a Preferred Bidder is to be appointed. From that moment, there is certainty about all partners who represent the LEP and key members of its supply chain. Some of the underlying activities within the stages are explained further in the following sections and **Appendix E1**.

1.5 Evaluation of bids by the Local Authority

The LEP, being a legal entity, is a joint-venture company limited by shares. It has a majority shareholding from the Private Sector Partner (PSP) of typically 80%, as shown in Figure 2-1 in chapter 2. The Local Authority (LA) selected its PSP through the evaluation of bids according to a range of criteria. The PSP needs to reflect the priority desires of the LA. For each LA, these are represented in the Evaluation Criteria. To interpret and use these criteria, the scoring matrix was developed by PfS. The priority scorings were expressed in weighting percentages. Following and OJEU notice (Figure 2), overall weightings and sub-weightings were registered in the Invitation to Participate Dialogue (ITPD) and Invitation to Continue Dialogue (ITCD) templates for BSF. The Competitive Dialogue was an EU procurement procedure (Directive 2004/18/EC) for use in 'particularly complex projects'. It became effective in the UK from January 2006. PfS recommended that the Competitive Dialogue was the most appropriate procedure for a BSF procurement which followed the PfS standard approach (PfS, 2006a). Based on this template each LA could allocate its own sub-sub-weightings to select a PSP. For private bidders, the scoring matrix emphasised more precisely how client's needs are allocated for their proposals. The following two tables (Table 1 and Table 2) set out the weighting criteria as depicted from the template (PfS, 2006c). Some further implications of the Competitive Dialogue procedure are discussed in section 3.3.5 and in **Appendix E2**.

Criteria weightings for a LEP project	
Criteria	***% of Overall Weighting***
LEP Partnership	*40*
PFI Sample School	*15*
Design and Build Sample School	*15*
ICT	*20*
Legal and Commercial	*5*
Financial	*5*
Total	100

Table 1: Evaluation criteria and weightings at ITCD stage

Sub-criteria weightings for the LEP Partnership		
Sub-criteria	**Sub-Criteria Weighting**	**% of Overall Weighting**
Overview of the LEP and Delivery of Partnering Services	25	10
Design Philosophy	15	6
Value for Money, Performance Monitoring and Continuous Improvement	30	12
LEP Business Plan	15	6
Interface Issues	7.5	3
Supply Chain Management	7.5	3
Total	*100*	*40*

Table 2: Evaluation criteria and weightings for the ITCD stage

No further judgements can be made on evaluation weightings, due to their indicative nature and the fact that they were specifically set for each LA. However, regarding this research it is interesting to see the detailed criteria for LA clients to select its PSP. For example, the sub-criterion about 'partnering' in Table 2 is further subdivided in Table 3 below.

Sub sub-criteria weightings for the Delivery of Partnering Services in a LEP project			
Sub sub-criteria	***Sub-Criteria Weighting***	***% of LEP Partnership***	***% of Overall Weighting***
Partnering ability of the LEP	*10*	*2.5*	*1*
Strategic Business Case development	*5*	*1.25*	*0.5*
New project design and development	*25*	*6.25*	*2.5*
Delivery of Approved projects	*20*	*5*	*2*
Supply Chain Management and Interface issues	*5*	*1.25*	*0.5*
Value for Money, Performance monitoring, and Continuous Improvement	*30*	*7.5*	*3*
Additional Services	*5*	*1.25*	*0.5*
Total	100	25	10

Table 3: Evaluation criteria for the ITCD stage: weightings for Partnering.

These sub-sub criteria correspond with the headings of the Partnering Services Specification, which are discussed in **Appendix G1**. Scorings are illustrative examples.

2. Economics of the Local Education Partnership (LEP) model[49]

2.1 Introduction

In chapter 1 and section 2.4.1 it was explained that the Local Education Partnership (LEP) is the key delivery model for BSF projects. This section will discuss the economics of the LEP and some of the most important legal covenants in the standard form Strategic Partnering Agreement that identify the legacy policy and are relevant for this research. These include: high level principles for partnering, granted exclusivity rights, key contract performance mechanisms and other incentive regimes. The policy literature used for this section is extracted from the most relevant sources, including the BSF guidance note: Economics of the LEP (PfS, 2008a), standard form Strategic Partnering Agreement (PfS, 2008c), and guidance booklet 'An Introduction to BSF' (4ps and PfS, 2008).

2.2 Understanding the LEP

Ownership and responsibility for all aspects of local education delivery (including BSF capital investment) remains with the Local Authorities. The LEP model creates a local development and delivery company through which strategic BSF capital investment can be efficiently and effectively deployed by Local Authorities into their secondary schools estate (PfS, 2004b). The LEP model is a Public Private Partnership (PPP) between a Local Authority, PfS and a private sector partner selected in open competition under EU procurement rules (PfS, 2004b).

The purpose of the LEP is to create a local business which provides long-term partnering services for the Local Authority so that the aims of BSF can be realised (4ps, 2005). The model in its most basic structure is represented in Figure 2-1 of the thesis.

[49] The literature used for this section is extracted from the BSF Guidance note: Economics of the LEP PFS 2008a. BSF Guidance Note: Economics of the LEP. London..

The reasons for the development of a LEP

LEPs help to achieve the ambitions of BSF because they:

- Aim to reduce costs by reducing the number of competitive procurements that have to be carried out and by streamlining the procurement process;
- Procure a strategic partner to deliver the long-term programme;
- Group schools together into larger, higher value packages than previously;
- Integrate these complex packages; they may include design, construction, ICT, maintenance and other premises related services;
- Optimise impact on educational outcomes by integration of building design and ICT
- Use both Design & Build and PFI contracts;
- May have more than one wave of work, with several years between the waves;
- Include only a small number of schools in the initial competitive procurement process to speed up the initial procurement and save bidding costs.

The participants in the LEP

Each of the three partners nominates directors to the LEP Board. As the LEP is effectively a private sector-led organisation, the Private Sector Partner (PSP) has four members and the Local Authority and PfS one each. The directors have to deal carefully with any potential conflicts of interest, and both the authority and PfS have certain minority rights in the conduct of business.

Each LEP is classified as a private sector entity. As a limited liability company, the LEP partners share capital and have a structure appropriate to such a company. The PSP owns 80% of the shares in the LEP. The remaining 20% is split equally between the Local Authority (10%) and PfS (10%). PSPs include a wide range of construction contractors, finance institutions, project managers and ICT providers (PfS, 2008a).

2.3 Standard business model for the LEP

The *Strategic Partnering Agreement (SPA)* and *Shareholders Agreement (SHA)* set out the business of the LEP and the services to be provided by the LEP to the Local Authority. The purpose of the LEP is to provide the Partnering Services as set out in the SPA and to deliver them in conjunction with its supply chain. The provision and achievement of the Partnering Services are the business activities of the LEP. They are to be conducted in the best interests of the LEP, on sound commercial principles, with a view to profit at all times in accordance with the Business Plan (PfS, 2004c; PfS, 2006d).

The BSF programme offered a standard business model for a LEP company, named the ‘Integrated Services Provider with SPVs’. The model relates to the extent to which the LEP takes commercial risk in delivering approved projects. The model enables a series of waves of investment in schools estate without the need for repetitive separate procurement. This structure meets the objectives of BSF effectively, whilst being commercially deliverable.

The LEP's role is to:

- work with the Local Authority and other local stakeholders to develop strategic investment plans for secondary education for the area;
- act as the single point of contact for the procurement and delivery of all the services needed to deliver the investment programme ranging from design, construction, project management and maintenance to ICT services;
- enable delivery of projects through a mixture of procurement routes – PFI and non-PFI conventionally funded.
- integrate and manage a diverse range of supply chain sub-contractors – ranging from building contractors and FM services providers to ICT suppliers;

The SPA allows the LEP to deliver approved projects either itself through conventional procurement or through Special Purpose Vehicles (SPVs) in case of PFI procurement. These SPVs are jointly owned by the LEP and the PSP although the LEP is granted a controlling interest in the SPV during the construction phase and a number of years post construction. This gives the LEP the control it needs to ensure good performance across all the contracts for approved projects, which in turn helps the LEP maintain its exclusivity and ability to secure future work.

The LEP is also responsible for the integration and management of its supply chain in delivering PFI and non-PFI contracts and for the management of risks inherent in those contracts and arising from the interfaces between those contracts. From a lenders point of view, this business model can create more efficiencies in financial structuring as it preserves the standardised PFI contract arrangement while enabling them debt financing of a number of PFI projects on a portfolio basis.

From a private equity investor point of view, the model provides the flexibility for them to be a part of the PSP and invest directly into a series of SPVs set up for approved projects in addition to investing in the LEP itself. Defaults on any single contract or activity can bring the LEP down and prevent the delivery of future projects. However, the model allows the PSP to manage risks, by structuring the business activities in a way that allows them to ring-fence and limit the exposure to a defined set of risks. By passing down all other risks to the supply chain the PSP within the LEP can ensure that contractual losses on one particular contract have minimal effect on the ability to deliver others.

A capitalised Holding Company can invest further into specific SPVs for particular PFI projects. A Holding Company is responsible for investing in the PFI SPV(s). The risks passed to the private sector in PFI and non-PFI contracts are broadly well-established and set out in the project agreements. How the LEP can capitalise Holding Companies and SPVs to limit risk exposure is an important issue underpinning the commercial viability of the joint venture. This is one of the key commercial skills a Local Authority is expecting the PSP to offer.

The rationale for establishing a LEP model was to enable a series of social infrastructure investments to be made without the need for repetitive separate tendering as required under the EU procurement rules. Ownership and responsibility for all aspects of local education delivery (including BSF capital investment) remained with the LAs. The LEP as a Public Private Partnership (PPP) typically consists of elements of horizontal (or institutional) partnership joint-venture where the public sector procurement function is partly privatised, and also a vertical (or contractual) PFI element where the agent is a purely private company. Both PPP structures are conceptualised by Weber and Alfen (2010) in the Figure 1 below.

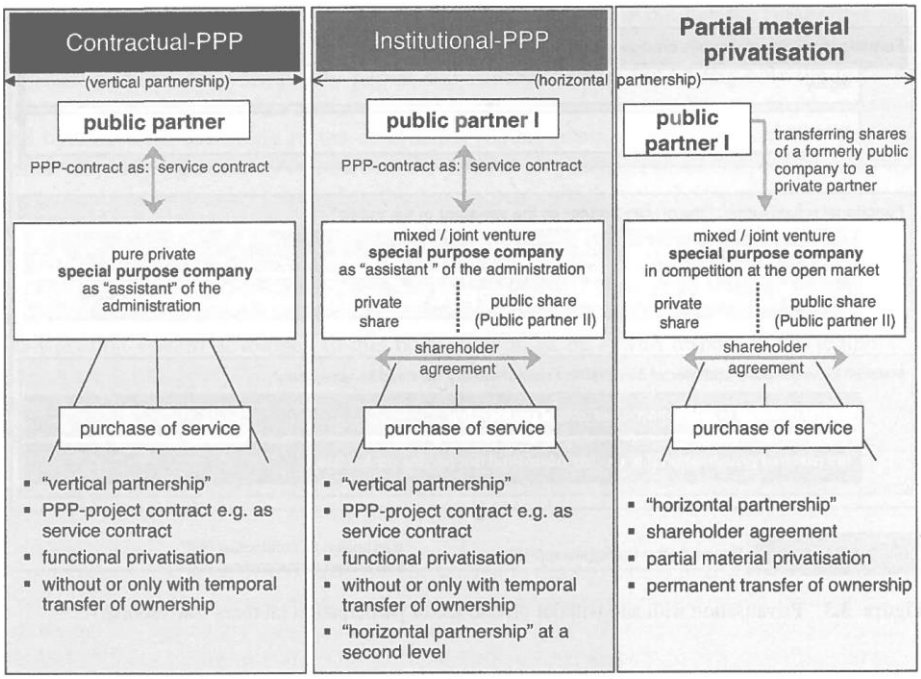


Figure 3: Structures of partnership models

In both cases, horizontal (institutional PPP) and vertical (contractual PPP), a principal/agent enters into a relation with a Special Purpose Vehicle (SPV) under the terms of a PPP contract. In contrast to contractual PPPs where the agent is purely private, the public sector retains a share in the SPV in the case of institutional PPPs. In 2016, Eurostat issued new regulation on off-balance sheet treatment of PPP contracts. If the construction risk, default risk, availability or demand risk under a PPP are comprehensively transferred to a private partner, the assets covered by this PPP may not be classified as government assets.[50]

2.3.1 A LEP in the institutional context of PPP

Under the horizontal structure, the LEP enters into a long-term Strategic Partnering Agreement (SPA) with the concerned Local Authority (LA). In the SPA, the LEP gets the sole and exclusive right to provide all the works and services for the initial capital project it tendered for, and any subsequent approved new projects identified in the LA's strategic plan. The SPA formally sets conditions for granting exclusivity to the partners in the LEP and requirements for it to perform (PfS, 2008c). Whilst the scope of each LEP can vary, in general it is expected to (PwC, 2010):

[50] Eurostat Guide to the statistical treatment of PPP contracts. Website: http://europa.eu/rapid/press-release_MEMO-16-3224_en.htm (visited: Feb-2017)

- develop strategic investment plans for primary and secondary education for the area;
- enable investment options of education provision and other social infrastructure through a mix of procurement routes, both PFI (Private Finance Initiative) and conventionally-funded;
- act as the single point of procurement and service provider;
- integrate and manage a diverse range of supply chain sub-contractors, ranging from building contractors and FM providers to ICT suppliers;
- deliver new/refurbishment projects under a long-term partnership agreement; and
- maintain the new/refurbished schools, including hard and soft FM and ICT.

The core rationale for the LEP being a joint venture company, with public sector investment alongside the private sector, is to (PfS, 2008c):

- embed partnership working;
- establish local entities specifically focussed on achieving the aim of BSF;
- combine what public and private sectors can best contribute;
- be a vehicle where the public and private sectors can work together;
- secure transparency of working;
- incentivise both public and private sectors to achieve success together.

Each of the three partners has a nominated director to the LEP Board. As the LEP is effectively a private sector-led organisation, the Private Sector Partner (PSP) has four members and the Local Authority (LA) and Partnerships for Schools (PfS) have one member each. The directors have to deal carefully with any potential conflicts of interest. The LA and PfS have both certain minority rights in the conduct of business.

The SPA and the Shareholders Agreement (SHA) set out the business of the LEP and the services to be provided to the Authority. Purpose of the LEP is to provide Partnering Services as set out in the SPA and to deliver them in conjunction with its supply chain. *"The provision and achievement of the 'Partnering Services' are the business activities of the LEP. They are to be conducted in the best interests of the LEP, on sound commercial principles, with a view to profit at all times and in accordance with the LEP Business Plan"* (PfS, 2004c; PfS, 2006d). The SPA stipulates that the LEP has two strands of activity, as Figure 4 (Figure 2-2 in the thesis) shows (PfS, 2004c):

1. **New Project Development**: through the provision of Partnering Services to the LA, where it will work with the LA and other local stakeholders to identify suitable projects for subsequent phases.
2. **Delivery of Approved Projects**: procuring and delivering approved projects through a supply chain. The LEP will also manage the on-going performance of the supply chain though benchmarking and periodically market testing.

The BSF programme offered a standard business model for a LEP company (Figure 4 by PfS (2004c)), named the 'Integrated Services Provider with SPVs'. The joint venture model relates to the extent to which the LEP takes commercial risk in delivering approved projects. The model enables a series of waves of investment in social infrastructure (especially schools) without the need for repetitive separate procurement. This structure was to meet the objectives of BSF effectively, whilst being commercially viable. The expanded LEP contract structure is shown in Figure 4 below (PfS, 2004c; PfS, 2008a).

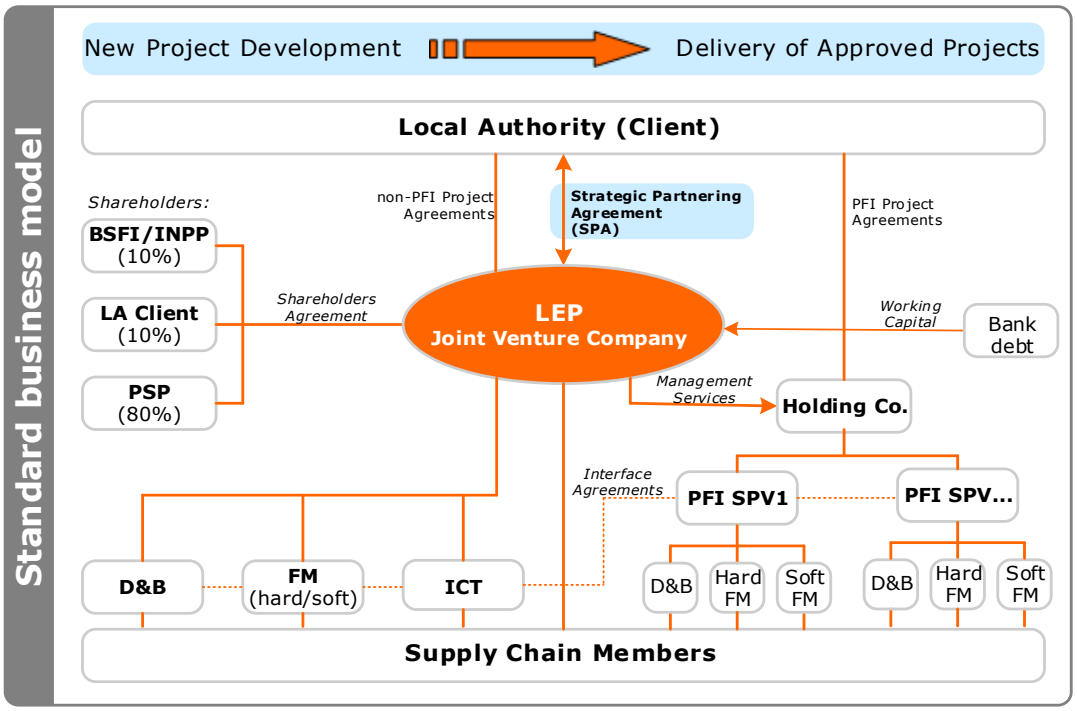


Figure 4: Standard LEP business model for developing and delivering BSF projects

The SPA allows the LEP to deliver approved projects either itself through conventional D&B, FM or ICT contracts. In case of Private Finance Initiative (PFI) procurement delivery is directed through Special Purpose Vehicles (SPVs). These SPVs are jointly owned by the LEP and its investors although the LEP is granted a controlling interest in the SPV during the construction phase and a number of years after construction. Thus, SPVs provide a LEP the control needed to ensure good performance across all the contracts for approved projects, which in turn helps them to maintain exclusivity and secure future works. The various contracts delivered through LEPs and the role of the SPA are further discussed in sections 2.4 and 2.5 of this Appendix.

In the UK health sector, where arrangements with LIFT have been similar to those for LEPs, Aldred (2008b) is taking a sociological perspective. In this way, tensions and ambiguities in the approaches to and implementation of LIFT are found, and contradictions between rhetoric and reality, as well as uneven risks and rewards. Joint venture governance is more challenging than corporate governance in a single entity. This is because of the joint ventures' board composition and decision-making processes, the resource flows from the shareholders, and the structure of the management team (Shaoul et al., 2013)

2.3.2 A LEP in the contractual context of PPP

Under the vertical partnership structure (Figure 3), LEPs are responsible for the integration and management of its supply chain in delivering PFI contracts. They are also responsible for the management of risks inherent in those contracts and arising from the interfaces between those contracts.

From a lenders perspective, a LEP business model could create more efficiencies in financial structuring. This is because it preserves the standard PFI contract arrangement while enabling

them debt financing of multiple PFI companies on a portfolio basis opposed to single assets. From an equity investor point of view, the model provides them flexibility as partner. They can invest directly into a series of SPVs set up for approved projects in addition to investing in the LEP itself. In this way it also secures pre-emption rights for secondary market sales, including on those PFI Project Companies they have a minority shareholding (BSFI, 2011). Defaults on any single contract or activity can bring the LEP down and prevent the delivery of future projects. However, the model allows the investors to manage risks, by structuring the business activities in a way that allows them to ring-fence and limit the exposure to a defined set of risks. LEPs can ensure that contractual losses on one particular contract have minimal effect on the ability to deliver others by passing down all other risks to the supply chain investors. A capitalised Holding Company can invest further into specific SPVs for particular PFI projects. A Holding Company is responsible for investing in the PFI SPV(s).

The risks passed to the private sector in PFI (and non-PFI) contracts are broadly well-established and set out in the Project Agreements (BSFI, 2011). How LEPs can capitalise Holding Companies and SPVs to limit risk exposure is an important issue underpinning the commercial viability of the joint venture. This is one of the key commercial skills a LA is expecting the equity investor to offer. An overview of the most typical risks inherent to LEPs and the various contractual options it can deliver are in **Appendix F1**.

2.4 The Strategic Partnering Agreement

The LEP model operates at three tiers. The first tier is to create a long-term partnership with a Local Authority. Contracts involved here are the Shareholders Agreement or 'SHA' (PfS, 2006d) and the Strategic Partnering Agreement or 'SPA' (PfS, 2008c). The second tier contracts are for the delivering of BSF projects throughout the long-term partnership. Contract documents involved here can be PFI, Design & Build, FM and ICT (PfS, 2005b). A supply chain of sub-contractors, specialist contractors, FM providers, ICT providers, designers and consultants is the third tier.

Following the selection of a preferred PSP under OJEU (Official Journal of the European Union) procurement rules, the LEP would work up to Financial Close (FC) as indicated in Figure 2. For a particular local area, the three shareholders had to sign the Shareholders Agreement. This establishes the joint venture company, and provides a framework within which it operates, including a LEP Business Plan approved by all shareholders. The agreement also provides the minority shareholders (BSFI/INPP and the LA) with consent rights over some important matters like business planning, project structures, market testing, management controls and dividend policies.

Purpose of the SPA

When Financial Close has been reached and a LEP was formed it entered into a long-term Strategic Partnering Agreement with a Local Authority for 10 years. The agreement has an

option of extension for a further period of 5 years. Clause 2 of the SPA explains the principal purpose of the agreement is twofold (PfS, 2008c):

1. **to establish a long-term partnership between the LEP and the LA, and for the LEP to provide or procure the provision of appropriate accommodation and related services to the LA for the purposes of the authority providing Education Services;**
2. **to foster the provision of high quality Education Services by the development and provision of high quality schools accommodation and services to the education community in the most cost effective manner.**

When the Local Authority and LEP enter into the SPA the agreement sets out (PfS, 2005b):

A. The exclusivity granted to the LEP to develop and deliver future schools projects in the area (following the Strategic Business Case or 'Strategy for Change' for that area), and
B. The conditions under which the 'exclusivity' is granted including the provision of Partnering Services, compliance with a two-stage approval process for each new project and demonstration of optimal Value for Money and continuous improvement.

The subject about 'exclusivity' in the SPA is further discussed in section 2.6 below. Essential terms and conditions under which a SPA is valid are explained in more detail in **Appendix G**.

The High Level Principles of the SPA

The aim of the clause 2 in the SPA is to identify nine "High Level Principles" which underpin the delivery of the parties' obligations and set out the key factors for a successful relationship between the public and private parties (PfS, 2008c). The principles are very aspirational and are therefore not legally binding. The High Level Principles are:

1. Close working relationships between the LEP and the LA at all levels;
2. A focus on achieving Best Value for Money operational performance within agreed timescales;
3. Setting business and cultural processes to enable parties to meet time and performance objectives;
4. Recognising each other's needs, constraints, limitations, capabilities, roles and responsibilities to achieve mutually beneficial outcomes;
5. Identifying weaknesses and strengths in the relationships amongst the parties;
6. A commitment to early recognition and resolution of differences, conflicts and disputes;
7. Support, defend and promote the long-term strategic partnering at senior level;
8. Developing openness and trust in a transparent data sharing environment;
9. Promoting equal opportunities by combating discrimination and promoting good relations between all sections of the local community.

The SPA recognises that the High Level Principles are difficult to measure in isolation. Clause 2.2 in the SPA cites: *"..successful implementation of the Project Agreements, the Shareholders Agreement and the Strategic Partnering Agreement will depend on the parties' ability effectively to co-ordinate and combine their expertise, manpower and resources in order to deliver an integrated approach to the provision of education services in the area and the services under this agreement".*

Strategic Partnering Board

A Strategic Partnering Board (SPB) was established to ensure that important stakeholders have some influence over the operation of the LEP in their area. School representation was essential to this. Members of the SPB are:

- a representative nominated by the LA from time to time;

- a representative agreed by the Board of Directors of the LEP;
- a non-executive, independent non-voting chairman of the SPB; and
- other representatives of stakeholders within the local secondary education community and any other co-opted persons the LA may nominate, not exceeding six in number, e.g. governors or headteachers.

The role of the SPB was stated in BSF guidance as (4ps and PfS, 2008):

- acting as the primary mechanism for managing the LEP's performance, based on reports provided by the LEP;
- serving as a forum for the open exchange of ideas, to enable the LA and the LEP to discuss forthcoming accommodation and service delivery requirements;
- giving guidance on and approving which new projects should be progressed, by whom and on what basis.

2.5 Contracts for project delivery through the LEP

The standard approach at the time, strongly recommended by the Department and PfS, for most LAs was to create a LEP. The BSF procurement process included the requirement for bidders to submit proposals for both the LEP and for a sample of the different types of projects that the LEP would be required to deliver over its lifetime. This includes: new build PFIs, Design and Build proposals for new build and refurbishment projects and ICT services. For some LAs a LEP-model was not required or appropriate. A critical success factor was the extent to which LEPs could develop effective partnering relationships with the supply chain members to deliver the SPA services. The main areas in which LEPs had to develop supply chain relationships were determined by their involvement in (4ps and PfS, 2008; PfS, 2005b; PfS, 2009a):

1. **PFI contracts;**
2. **Design & Build (D&B) contracts;**
3. **Facilities Management contracts for soft FM and hard FM;**
4. **ICT Services contracts;**
5. **Non-BSF framework contracts (e.g. social housing, regeneration, offices, leisure facilities)**

Each of these contract types is discussed further below.

2.5.1 PFI contract structure in BSF

The BSF standard business model for a LEP required no real alternation to the standard PFI model contract. Investors into PFI SPVs in BSF projects have the same protections and risks as equity sponsors into existing PFI SPVs in England. The BSF PFI Project Agreement has been approved by HM Treasury and is consistent with the SoPC3[51] (Standardisation of PFI Contracts). The exception to this are the contractual provisions within the SPA pertaining to the performance of the PFI SPVs and their impact on either the exclusivity rights of the LEP

[51] The SoPC3 (HM Treasury, April 2004), SoPC4 and SoPF2 provide the basis of public sector specific guidance and PFI or PF2 contracts in health, education, defence, prisons, transport and local authorities' buildings.

or termination of the SPA (PfS, 2008b). In general, the contractual structure of PFI school contracts and interface with LEPs looked like Figure 5 below:

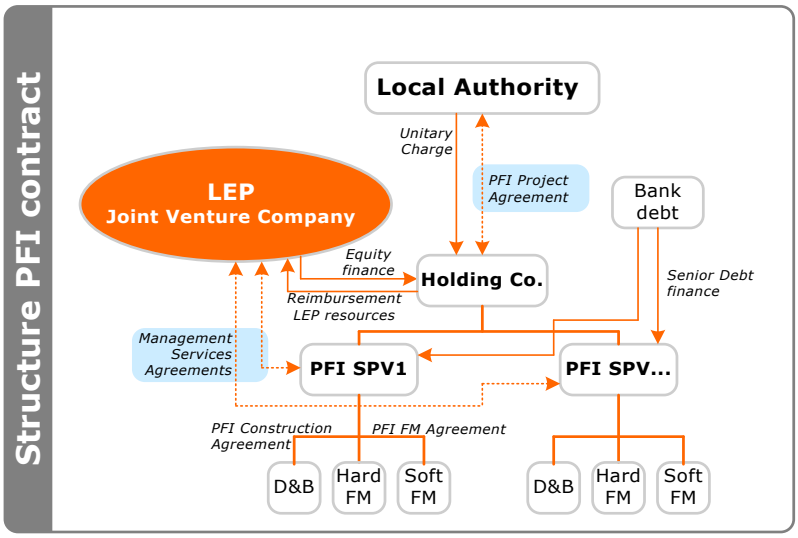


Figure 5: Contractual structure/money streams for PFI projects (PfS, 2004c)

The LA enters into *PFI Project Agreements* for the delivery of schools projects through PFI. These contracts are Design, Build, Finance, Maintain and Operate (DBFMO) arrangements, under which the PFI SPV will take responsibility over a 25 to 30 year period for the schools facilities. To recover the capital invested in these facilities, the SPV gets paid a Unitary Charge every year of the contract, subject to performance against the mechanisms set out in the PFI Project Agreement. Deductions are made from the Unitary Charge for shortfalls in performance. Equity finance from the LEP and other investors is to cover risk, running costs, fixed costs and overheads procured at LEP level and provided to SPVs. The PFI SPVs reimburse the LEP for resources, such as:

- LEP Management Fee (recovery of set up, development and running costs with a LEP Margin of about 15%);
- Management Services Fee (recovery of running costs of active PFIs with a margin of about 5%);
- Sponsor returns from being equity investor in the underlying PFI SPVs.

The LEP is required to enter into Management Service Agreements with any SPV project companies that it sets up, for the management of such companies. They have to be subsidiaries of the LEP for a fixed period. Through this the LEP has overall control of performance for each project across the BSF programme.

Once a contract was signed, LAs received financial support towards the cost of the project through PFI Credits from the government, under the Local Government (Capital Finance) Regulations 1997. This contribution was intended to cover only the repayment of capital and life cycle maintenance. The LA would need to cover the remainder of the charge, often referred to as the Affordability Gap. The revenue support was a contribution to the unitary charge that the LA would be contractually committed to paying to its PFI contractor. PFI Credits were abolished by the government in 2013.

2.5.2 Contractual structure for Conventional D&B Projects in BSF

The assumption of BSF was that the conventionally funded projects would involve the major and minor refurbishment projects and some small new-build schools. For conventionally funded projects, the LA entered into a *Design and Build (D&B) Contract* with the LEP for the delivery of works and/or services (PfS, 2008a). The D&B contract structure and interface with the LEP is shown in Figure 6 below.

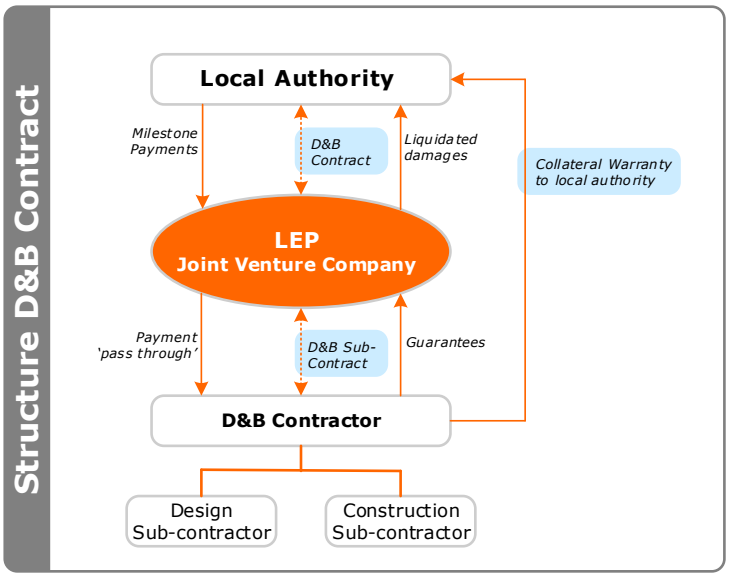


Figure 6: Contractual structure/money streams for D&B projects (PfS, 2008a)

In a D&B Contract the LA prepares a performance specification for the building works required and invites the LEP to state how it proposes to meet those requirements. So these contracts require the LEP to design and build the schools facilities to the LA's specifications. The D&B Contract provides for the LEP to subcontract the works. The sub-contract passes through all significant risks and obligations undertaken by the LEP under the main D&B Contract. In effect, the LEP is acting here as a 'management contractor', employing the D&B sub-contractor.

The D&B Contract is based on a form of contract that fits in the context of PFI. Payments are made by the LA to the LEP on the achievement of milestones set out in the contract. A Guaranteed Maximum Cost (GMC) and a Target Cost have to be agreed between the LEP and the LA.

The obligations of the LEP under the D&B contract are to carry out or procure the design, construction, completion, commissioning and testing of works so that each facility is completed on or before its relevant date of completion complying with the Authority Requirements (ARs).

2.5.3 Contractual structure for FM Services

Once a BSF school has been procured under a conventionally funded D&B Contract, there may be on-going maintenance requirements which may involve the LA requiring the LEP to price and contract for such Facilities Management (FM) services. The *FM Services*

Agreements would need to be developed on a project-specific basis reflecting local decisions on scope and funding for FM services, and existing local arrangements for these services.

2.5.4 Contractual structure for Managed ICT Services

A carefully specified and procured Managed ICT service was intended to allow schools to get on with their core business and not be distracted by technical challenges. LEPs can be responsible for procuring these services for schools. The LEP may sub-contract the obligations to a specialist ICT provider. The ICT contract involves the provision of managed services, including: design, installation, and management and training of the operational services. The ICT contract structure and interface with the LEP is shown in Figure 7 below.

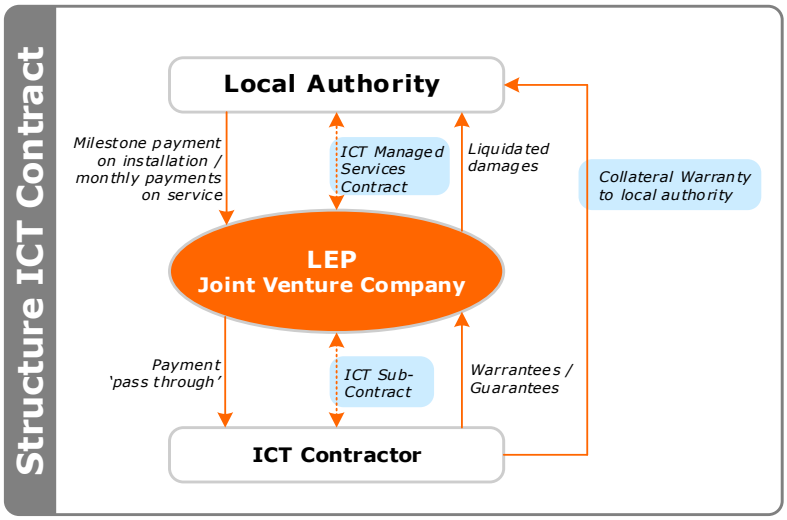


Figure 7: Contractual structure/money streams for ICT projects (PfS, 2008a)

The LEP is required to deliver a collateral warranty from any ICT sub-contractor. The *ICT Managed Services Contract* follows a traditional commercial approach, rather than a PFI model. Payment for the installation phase is made in milestones against completion, and payments for the operational service period is processed through on-going service charges against pre-set KPIs and performance goals. The LEP may also receive payment deductions for underperformance and/or unavailability of the managed ICT services (PfS, 2008a).

2.6 Exclusivity granted to the LEP

Most of the BSF schools were delivered through LEPs under exclusivity arrangements. Under such arrangements LEPs can utilise a variety of other means instead of separate competitive tendering of each project to provide economic assurance, in particular:

- when selecting a private partner and establishing the LEP, at least two schools are designed and costed in competition to provide a local benchmark of costs for the future projects;
- by using standard form contracts agreed when establishing the LEP and guaranteeing reduced prices for each project, LEPs hope to share the cost savings of long term partnering;
- there is also periodic market testing of sub-contractors and performance monitoring of the LEP itself, with the threat of terminating the exclusivity arrangements if the LEP does not meet the required level of performance, and
- some LEPs, called integrators, hold competitions for selecting subcontractors to scope each project.

Source: Public Accounts Committee (2009)

The LEP has the first exclusive right to propose solutions and develop New Projects identified in the Authority's strategic plan. This right of 'exclusivity' is contingent on the performance of the LEP in procurement and delivery activities (as mentioned in section 2.3.1). According to clause 7 of the SPA, a LEP has the exclusive right to:

1. provide all Partnering Services to the Local Authority of projects within the area;
2. carry out any future capital project within the area having a capital value of over £100,000;
3. provide the project works and services for any Approved New Project.

A LEP has effectively the exclusive right for its supply chain, to deliver the initial projects for the first five years. From year five, the services supplied by the LEP and its supply chain have to be benchmarked and market tested due to European procurement regulations (PfS, 2008c).

Loss of exclusivity

If the LEP does not perform adequately it can also lose its exclusivity. In circumstances where the LEP's underperformance has resulted in a loss of exclusivity the LA can remove the LEP's exclusive rights in relation to the re-tendering of any project to which the LEP was a party (PfS, 2008c, SPA clause 7.5).

The LEP's performance was monitored on a project level by the LA, and at a national level by PfS/EFA. After the cancellation of BSF in 2010, LEP monitoring was limited to Authority level only. The standard contract contains a number of remedies to protect the interests of the client if a LEP's performance is below the required standard. These range from payment deductions, through loss of exclusivity, to termination of the contract (4ps and PfS, 2008). The LEP could lose its exclusivity if (PfS, 2008c, SPA clause 7.5):

1. the Approval Criteria for New Projects are not met;
2. there is a LEP default;
3. there is a default by one of the LEP's project companies.

In reality, while the threat was there, no LEPs have actually been terminated because of the risk of failing performance and exclusivity criteria set out in the SPA.

2.7 Performance incentives for the LEP

For LA clients, 'exclusivity' is a method that can help them incentivise the LEP to provide Best Value for Money performance on its projects, without jeopardising the long-term partnership. **Appendix G1** provides a breakdown of the key contract performance requirements in the SPA:

No.	*Contract mechanism*	*Schedule*
1.	LEP Business Plan	SHA, Schedule 3
2.	Partnering Services Specification	SPA, Schedule 12
3.	Collective Partnership Targets	SPA, Schedule 14, part 1
4.	New Projects Approval Procedure	SPA, Schedule 3
5.	Cost Benchmarking Procedure for New Projects	SPA, Schedule 21
6.	Market Testing Procedure for New Projects	SPA, Schedule 4
7.	PFI Payment Mechanism & PMS	PA Payment Mechanism, Schedule 6
8.	Non-PFI FM/ICT Payment Mechanism & PMS	SA Payment Mechanism, Schedule 5

9.	PFI Benchmarking & Market Testing	PFI Project Agreement
10.	LEP/SPV Board Report & Management Accounts	Management Services Agreement
11.	Key Performance Indicators	SPA, Schedule 14, part 2
12.	Continuous Improvement Targets	SPA, Schedule 15

Table 4: Key contract mechanisms in BSF standard form of contracts

In addition to Table 4, the SPA has some other performance thresholds for LEPs to achieve.

2.7.1 Approval Criteria for New Projects

The LEP's sole exclusive right to procure and deliver any projects identified in the LA strategic plan is subject to meeting the Approval Criteria set out in the SPA. These involve (PfS, 2004b):

- Demonstrating good track record performance on delivering projects previously approved by the LA;
- Demonstrating that the LEP's proposals meet the strategic requirements of the LA, offer Best Value for Money and affordability, and are compliant with law and regulations; and
- Demonstrating performance against a 'Continuous Improvement Plan'.

2.7.2 LEP event of default

On the occurrence of a LEP event of default the Local Authority may act following the Table 5 below (PfS, 2008c, SPA clause 13):

	Brief description:	***Consequence:***
a.	Termination of a PFI Project Agreement or D&B Contract	Right to remove exclusivity
b.	Termination of Project Agreements	Right to remove exclusivity
c.	Occurrence of any significant performance failure pursuant to KPI tests	Opportunity to remedy
d.	Material breach of the SPA pursuant to Collective Partnership Targets	Opportunity to remedy
e.	LEP ceasing to supply all or a substantial part of the Partnering Services	Opportunity to remedy
f.	Non-payment of amounts by the LEP	Right to remove exclusivity
g.	Insolvency event in relation to the LEP	Right to remove exclusivity

Table 5: LEP events of default

If a LEP event of default occurs, a hierarchy of remedies applies. First, payment deductions at project agreement level; Second, replacement of supply chain member; Third, termination of project agreement(s); Fourth, replacement of the PSP; and Finally, removal of exclusivity and termination of SPA (PfS, 2005b). In reality, no LEPs were closed because of performance failure or event of default, however there have been instances that this was nearly the case.

3. Wider criticism about BSF

There are several other critical reports that arrived prior to and after the DfE Review of Education Capital. A number of which are considered as part of this research. These are summarised in the subsections below.

3.1 Education and Skills Committee (2007)

The Select Committee undertook a major review of the BSF programme in 2007 covering its planning and procurement, the focus on educational transformation, and sustainability. It concluded that: *"delay in the programme is a less significant risk to its success than inadequate preliminary thinking and clarity at a local level about what is required"* and therefore that BSF as a programme should *"take the time to get it right"* (House of Commons, 2007, pp. 60-61). Bidders for BSF funding claimed that the labour needed to put together a bid was onerous, very costly, and required liaison with many government bodies. This in turn caused the delays. However, the fact that planned and reactive FM costs of school buildings are ringfenced in long-term PFI and FM contracts reversed a tendency for school governing bodies to under-allocate funds for these aspects of asset management, which in the past led to many schools facing high amounts of backlog maintenance (House of Commons, 2007).

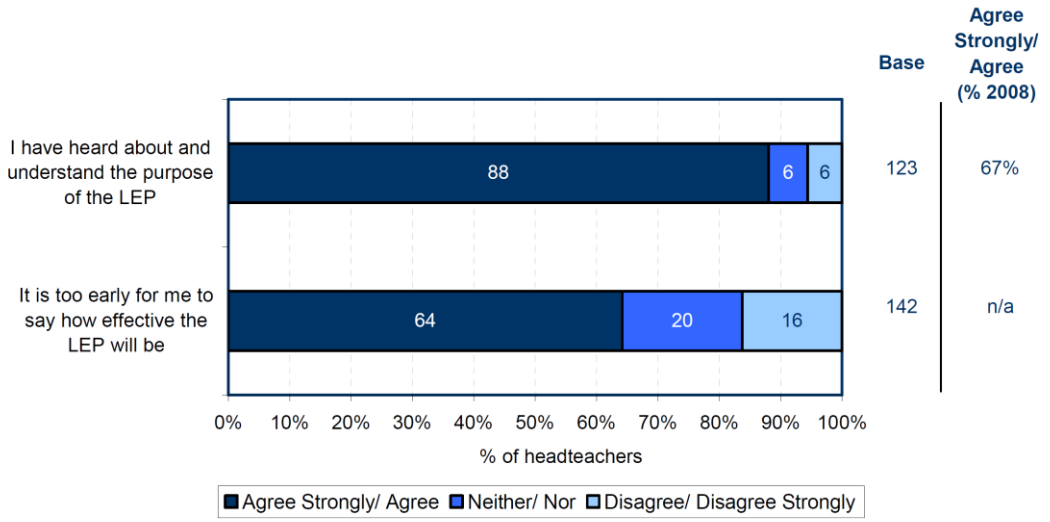
The Committee report recommended that: *"The DCSF and PfS should develop as a priority a knowledge management and learning strategy to support Authorities, schools, contractors, suppliers and others involved in BSF to share best practice and learning as the programme develops"* (House of Commons, 2007, p. 60). This statement already implied at an early stage the importance and need for continuous and collective learning. The scale of BSF was far larger than the capacity of the available pool of experienced architects and designers, while the educators running the developments have very little prior experience of commissioning such major construction works before. There was however not much sharing of best practice information and learning between LAs, schools, contractors, and suppliers involved in BSF, and timescales were set that did not encourage detailed up-front planning. During the early years of BSF there were very few people with experience of building new schools using the strategic procurement system, so learning and knowledge management aspects of the programme as it progressed was key. The Committee concluded that it would be a real missed opportunity for the BSF programme if the lessons that people had learned in the process were not taken on board by others following behind.

3.2 PwC longitudinal review of BSF (2007-2010)

The Department had commissioned PwC in 2007 to undertake annual evaluations of the effect of renewing BSF schools, the first of which established a baseline. PwC produced three annual reports and a procurement review until its appointment was cancelled along with BSF in 2010. Recommendations from the latest annual report in February 2010 are summarised as follows:

- **Sharing the vision of 'Education Transformation'**. BSF was more strategic and visionary than other capital programmes and allowed both LAs and schools to share views to completely reorganise the school estate to deliver across a range of policy agendas, e.g. 'Every Child Matters' agenda and 'Extended Schools' initiative. There was no clarity over the definition of educational transformation. Nevertheless, PfS was involved in dissemination activities such as: guidance notes, case studies and lessons learnt material.

- **Approach to LEP procurement**. In 2010 it was still too early to put forward an overall assessment of the LEP. However, according to a headteacher survey by PwC in 2010, of those who responded, 88% agreed that they had heard about and understood the purpose of the LEP (Figure 8 below). Notwithstanding the increased awareness of the LEP's purpose, a significant proportion of respondents – almost two thirds (64%) – suggested that it was too early for them to judge the effectiveness of the LEP.

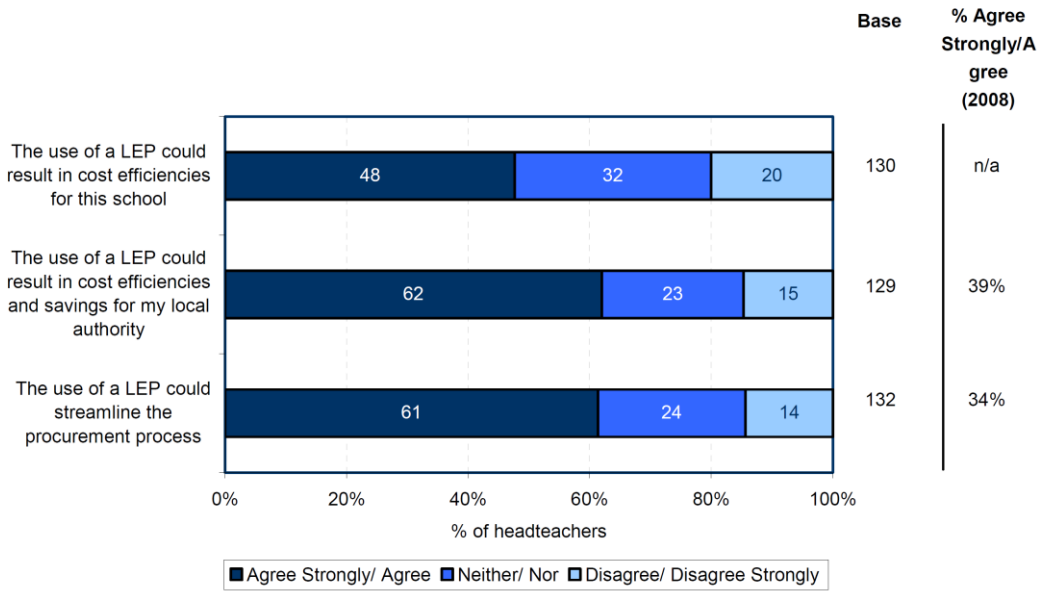


Source: PwC (2010)

Figure 8: Understanding of the LEP and its potential effectiveness

- According to the same headteacher survey, a higher proportion of headteachers (62%) agreed/strongly agreed that LEPs could result in cost efficiencies for their LA (Figure 9 below)[52]. When asked if the LEP would result in cost efficiencies for the school, about half (48%) of headteachers agreed/strongly agreed, compared to only 20% who disagreed/ strongly disagreed. However, almost a third (32%) of the headteachers have yet to be convinced either way whereas 61% of the headteachers who responded agreed or strongly agreed that LEP could streamline the procurement process.

[52] Totals on the Figure do not sum to 100 due to rounding.



Source: PwC (2010)

Figure 9: Perceived effectiveness of LEPs

- **Timeliness**. The scale and complexity of local BSF projects was such that they did not always meet the delivery targets. The extent of actual delays and slippage was in some cases experienced by schools, and impacted on the overall construction timetable.

- **ICT**. BSF schools needed to be more convinced that the loss of control over how ICT is provided would offset improved levels of service and provision through managed services. Schools had expressed a strong reluctance to move away from their current arrangements and some had developed a 'mindset' against participation in managed ICT services.

- **Defects**. Whilst schools recognised that dealing with snagging issues can take time, there appeared to be high frustrations with the process. Notwithstanding this, schools and LAs were unanimous of the need to ensure that the design and quality of new/refurbished buildings was fit for purpose and future proof.

- **Value for Money (VfM) and cost effectiveness**. In 2010, it was still too early to make a firm assessment on the VfM and cost effectiveness of BSF projects. PfS/EFA were collecting cost data, however the process of benchmarking, checking and validating cost information returned by LAs remained ongoing and it took time before sufficient and robust information was available in order for an overall assessment to be made. PfS/EFA should have continued to collect robust cost benchmarking data from LAs post 2010 as the LEP model is reliant on this to operate.

3.3 NAO Report (2009)

In 2009, the delivery objectives of BSF were repeatedly stated as being overly ambitious. The NAO criticised the high cost of establishing the first 15 LEPs, which were seen to have been inflated by LA's extensive reliance on professional consultants. However, it was acknowledged

that PfS had since *"taken measures to control capital costs so that BSF capital costs are similar to most other school building programmes and cheaper than Academies built before their integration into BSF"* (NAO, 2009, p. 9). This was not a view which was destined to survive beyond the New Labour government (James, 2011). Green (2011) commented that the procurement of schools (with LEPs) had undoubtedly become a politicised agenda. The construction sector was tasked ultimately with delivering such politicised agendas, and hence the rhetoric of industry improvement became inherently politicised. Certainly construction improvement was no longer focused solely on efficiency improvement; firms were also required to demonstrate their credentials in terms of social and environmental sustainability. Many simply employed consultants to develop and maintain the latter storyline, while they themselves concentrated on 'managing the supply chain'.

The NAO (2009) evaluation of BSF further pointed towards the difficulties of establishing effective working arrangements and relationships between LAs and private sector partners. In his book, Green (2011) also noted that the paradoxes of partnering and collaborative working seemingly cannot simply be wished away in the cause of VfM. Perhaps most telling of all was the observation that there is a general lack of skills in procurement and programme management across the public sector, and that this constrained capacity within BSF. It seems that irrespective of the extent of privatisation the public sector cannot achieve VfM without its own expertise in procurement and programme management. LAs may in the future choose to take back in house some of the expertise that they have lost. Perhaps a future government may even return to the idea of public sector 'property services agency' (Green, 2011, p. 283).

3.4 Public Accounts Committee (2009)

The Public Accounts Committee (PAC) reported in 2009 many shortcomings of BSF. These are summarised as:

- The Department's poor planning and persistent over-optimism has led to widespread disappointment with the programme's progress and reduced confidence in its approach and the ability to include all schools by 2023. Such over-optimism was systemic across the Civil Service's planning of major projects and programmes.
- The Department and PfS wasted public money by relying on consultants to make up for shortfalls in own skills and resources.
- The VfM of using LEPs has still to be proved. The Department planned that most schools would be procured without competitive tendering. Both the cost and time of establishing a LEP have been greater than they need to be: £9m to £10m to procure a LEP and design the first projects, at an average of 102 weeks. These cost could be reduced by up to a third by preventing avoidable delay to projects, using fewer consultants to undertake core LA roles, restricting the number of schools selected at the start and keeping to standardised documentation.

- PfS does not provide LAs with enough information to build cost comparators and compare the price of each project. Projects have been slow to provide cost data. Although projects were required to give information within one month, PfS failed to collect sufficient data and publish cost comparators for every LA. The system provided insufficient information on the Whole Life Costs (WLC) and the on-costs, including the administration, procurement, financing, maintenance, lifecycle and PFI contract variation costs. This limited the ability of LAs to conclude on the VfM appraisal of each school or select a procurement route.
- Some LAs felt forced to adopt a LEP model against their own judgement of what produced the most VfM. The Department and PfS have said that LAs were free to choose their procurement approach so long as they can demonstrate that their alternative will be VfM.

The PAC observed that although on paper LEPs look like they might provide cost benefits, at the time it was too early to tell whether they would, and their VfM was yet to be proven. In 2009, the handful of schemes that had agreed terms for a deal through an operational LEP have found that using the LEP achieved time and cost savings, but too few LAs had reached this stage to be able to assess whether these savings were likely to outweigh the cost of establishing the LEP. PfS had not managed to convince all LAs of the potential benefits of a LEP, and had not put in place measures to evaluate whether those benefits were being achieved (Public Accounts Committee, 2009).

3.5 DfE Review of Education Capital (2011)

The Review of Education Capital did acknowledge that following the cancellation of much of the BSF and Academies programme, a relatively small part of the secondary estate – approx. 840 out of 3,500 schools – has been, or would be, modernised. The review was critical on many fronts as previously outlined in chapter 1.

One of the areas that the Review was particularly critical about was the lack of evidence of an effective way of learning from mistakes (or successes). The need for *"continuous learning to improve quality and reduce cost"* was evident from the Review. The Review team were concerned that the lack of consistency of design and approach meant that there were no opportunities to engineer the costs down and to benefit from learning.

On the capital cost of schools, the variation in price per m^2 is in part due to changing legislative standards and requirements relating to carbon reduction. The Review report states that: *"it is typical of a process of bespoke production that does not maximise the potential for continuous learning and improvement, or the development of more cost-efficient construction approaches. More importantly there is little evidence of convergence to a standard over time"* (James, 2011, p. 26).

On the Design and Build process, one of the principal issues identified in the Review with the [BSF] system *"is the lack of learning and systematic improvement of quality, cost and time from one school building project to another"* (James, 2011, p. 52). This has been caused

directly by the design and procurement process which has resulted in most schools designs being ad-hoc. Among the many knock-on problems that this has created are high costs (of both design and build), variable quality, a need for every school to pass through an arduous cycle of checks and balances, and no opportunity for improvement.

The Review recommended that: *"a system should be put in place that continuously learns and improves upon the standardised drawings and specifications. The Review believes that thorough Post Occupancy Evaluations should be applied to each project without fail, and the learning from these should be applied to successive projects and to the baseline standards"* (James, 2011, p. 54).

The review also looked at whether performance has improved in schools completed under BSF faster than in non-BSF schools (James, 2011, p. 13). Section 2.8 of the report concluded that *"no such evidence could be found, though it is clear that it is relatively early days to make these measurements with a high degree of confidence. Some research has suggested that performance in BSF schools dipped during and directly after rebuilding as so much head teacher, and pupil time was spent worrying about building designs"* (James, 2011).

3.6 ICAS Report: Losing control in Joint Ventures (2013)

The report by the Institute of Chartered Accountants of Scotland (ICAS) was based on a case study analysis in relation to (Shaoul et al., 2013):

- The complex LEP organisational structure used as a delivery mechanism for BSF;
- The limited and aggregated financial reporting, and patchy oversight and scrutiny, leading to a loss of day-to-day control over what is ultimately public expenditure; and
- The loss of accountability as control moves away from elected local government into the hands of the private sector and a distant national level agency of the DfE.

The report includes a number of recommendations, some of which are discussed further in this thesis (chapter 3). The authors highlighted ten key findings:

Organisational structure. First, LEPs add further complexity to the predecessor PFI schemes whose legal and corporate structures were already complex. Reliance on costly legal and financial advisors is thus significant. These joint venture structures are difficult to identify and they disguise where the decision-making power actually lies.

Second, despite government recommendation for a standard LEP structure, in practice a number of LAs adopted a structure without a LEP. This implies that 'one size does not fit all'.

Third, information sharing between LAs was limited. This should have been facilitated by PfS/EFA, but was not. One outcome was a shortage of cost benchmarking data reducing LAs' ability to control costs.

Financial reporting. Fourth, reporting of BSF is both fragmented and too aggregated. It is fragmented due to the complex organisational structures, which straddles the boundary between public and private sector, including entities from central government, LAs, schools, construction and FM companies and financiers. Whilst the adoption of International Financial Reporting Standards (IFRS) by the UK government has brought more standardisation into the financial statements, assets, related liabilities and cash flows are aggregated together with other similar items in most cases.

Fifth, joint venture reporting lacks transparency for the informed user. At central government level there is no clarity about the overall cost of the programme. At LA level, it was impossible to track all money flows through the LA, LEP and SPV accounts as these provide minimum disclosures, reducing the usefulness of information for the public.

Oversight and scrutiny. Sixth, oversight necessarily differed between LAs because they had different internal structures, but in each case there was a clear split of responsibility for monitoring capital and revenue expenditures, with the focus for oversight resting on the capital expenditure. LEP Board meetings, which establish governance and monitoring arrangements, focused more on the pre-Financial Close and construction phases, than the operations phase.

Seventh, there was a lack of strategic planning for funding and managing FM on conventional D&B projects, due to the loose coupling between the capital and revenue expenditure systems. If schools fail to put aside a portion of their budget for FM, the built estate may again deteriorate over time. Whilst PFI schools have FM built into the contract, this is a locked-in cost that must be paid before other claims on the budget. Therefore, over time affordability may become a concern as has occurred with PFI hospitals.

Eighth, there is little evidence of on-going scrutiny of BSF as following its cancellation it turned out of the public spotlight, despite the significant on-going expenditures. At national level, the EFA oversight of Academies is less in terms of both scope and scale in comparison to LA maintained schools. Oversight by EFA is less personalised, and also more distanced, as the rationale for Academies is to give schools more individual freedom and independence from state control.

Accountability. Ninth, greater control over what is ultimately public money, even if some funds initially come from private sources, now rests with the private sector and the related accountability structures for education are at risk. Through BSF, once LAs have entered into contracts with LEPs, control passes to privately controlled joint ventures, which have become in substance public authorities, but without the commensurate responsibilities and accountability mechanisms. There are potential and actual conflicts of interest within the LEP Board, due to the fact that directors from the public and private sector have dual roles, acting both as directors of the LEP Board in addition to duties as directors of the Private Sector Partners.

Tenth, the inclusion of Academies in BSF has shifted accountability structures from local to central government. Academies have in effect become businesses, and accordingly must adopt similar governance structures. The headteacher is the designated Accounting Officer for public accountability and the governors become non-executive directors. This raises the problem of attracting sufficiently qualified and experienced people to undertake these roles, especially in areas of economic deprivation. It also creates further opportunities for the private sector to offer business and governance training on how to fulfil these roles.

3.7 Education Select Committee, House of Commons (2010-2014)

The *House of Commons, Education Select Committee* met for the last time on 18 March 2015 following a public consultation on four topics:[53]

1. How the allocation of funding under the PSBP programme has affected schools, including those who were due to receive funding under the BSF programme.
2. The impact on schools in need of repair or rebuilding that have not received funding.
3. Experiences of schools who received funding under phase 1 of the PSBP programme.
4. The Value for Money of the PSPB Programme compared to the BSF programme.

Especially the fourth topic is of relevance to this research. It is difficult to compare the true Value for Money of both programmes as they represent the delivery of two different ideologies:

- BSF was based on the thinking that inspirational buildings would raise the aspirations of pupils and staff and drive increased progression and attainment.
- PSBP is founded on the belief that good teachers can teach in any conditions and that all we need to provide is a good quality fit for purpose environment.

The Committee has also expressed concerns that, whilst the investment in spaces to support learning is unprecedented, the enormous scale of BSF is not being managed to ensure that its scope and aims remain appropriate. There have been no clear or consistent objectives set down to judge how well the programme was progressing, or to establish if this is the best way to spend a £45-55bn budget on school capital. In summary, to highlight the major differences between the programmes Table 6 below compares BSF and PSBP:

	Building Schools for the Future	**Priority School Building Programme**
Underlying ethos	"Inspirational learning environments" "Delivering educational transformation"	"Functional, fit for purpose buildings".
Design principles	Exemplar architecture BB98 and BB99 plus 'extras', such as achieving BREEAM 'Very Good' to 'Excellent'.	Standardised/component based design BB98 and BB99 less 15% floor area, Facilities Output Specification.
Dedicated specialist spaces	Dedicated rooms for music, dance, theatre, community, etc.	Multi-use performance spaces.
Dining and kitchens	Bespoke design, full school dining capacity, separate dining areas for older year groups.	Formulaic dining areas sized to require staggered timetable, kitchen size do not easily facilitate religious dietary needs.
SEN in mainstream schools	Design reflective of SEN need in community demographics.	Set formulaic allowance irrespective of community demographics/need.
New school location / externals / sports facilities	Wide spread use of temporary accommodation to allow the optimum building location.	Temporary buildings are considered a waste of money, significantly restricting the optimum location of the new school. Location has to cause minimal impact,

[53] Education Select Committee website:www.parliament.uk/business/committees/committees-a-z/commons-select/education-committee/news/priority-schools-building-evidence-session (visited: Jan-2016)
Education Select Committee website: www.parliament.uk/business/committees/committees-a-z/commons-select/education-committee/news/psbp-one-off-session (visited: Jan-2016)

	Building Schools for the Future	Priority School Building Programme
	Master planned campus developments with welcoming designs, all new sports provision and mature landscaping.	facilitating maximum re-use of existing external infrastructure and landscaping.
ICT provision	Completely new ICT infrastructure, all new ICT equipment and managed ICT services.	New infrastructure but with re-use of legacy active equipment where possible, no new equipment, no centralised managed service.
Furniture, fixtures and equipment	All new fixed and loose fittings, furniture and equipment (FF&E) including multiple breakout areas etc.	Minimum provision possible. New fixed FF&E but re-use of legacy wherever possible, no budget for new loose FF&E unless school is expanding.
Impact of facilities management risk profile	Because FM risk was with the contractor they tended to over-design specific components, to reduce the risk of unavailability reductions.	FM risk sits with school / LA therefore contractors design only to meet the specification requirement.
Building life	60 years	60 years
Construction budget for an average 964 pupils school	£23.5m for 9,292m^2 floor area	£12.96m for £7,124m^2 floor area
Cost per m2	£2,529/m^2	£1,450/m^2

Source: Wates Group as ESC member, 2015

Table 6: High level comparison between BSF and PSBP

Ultimately, under PSBP the EFA 'baseline designs' aim for new schools to be built at £1,113/m^2 (excluding external works, particular circumstances and fees). When externals and fees are added this amounts to around £1,450/m^2 (EFA, 2014). According to a report by RIBA this is: *"simply too cheap to achieve quality schools that will stand the test of time, particularly in the current economic environment where it is becoming more expensive to procure the same products and services due to inflation. Through cutting costs and sizes of schools, the PSBP programme may create flaws that will cost the government more - in escalating repairs and rebuilds of PSBP schools – than it will initially save"* (RIBA, 2014, p. 7). The critical report makes four recommendations:

- Increase cost per m^2 for PSBP schools by 20%. The extra money should go towards increasing space outside classrooms within schools, higher specification materials, and improved external works. The impact of the change can be mitigated through innovating construction processes (e.g. maximising off-site manufacturing and assembly potential), and innovative PPP building;
- The size of schools funded by the Government should return to the areas recommended in BB98 – Secondary Schools, BB99 – Primary Schools and BB102 – Special Schools. New schools are now 15% smaller than those built under BSF, and have smaller corridors, assembly halls, canteens and no standalone atria. This could have a direct impact on FM costs and student well-being.
- The scoring on procurement to be changed from a 'cheapest wins' approach to improve design and deliver long-term cost effectiveness and social value. External works such as quality landscaping should feature as a criterion;
- Understand how schools shape outcomes by further improving research on all schools built to increase knowledge about the effectiveness of those schools. Research should include data on management, maintenance, energy costs, and other indicators PSBP schools are required to record; as well as indicators on pupil and teacher wellbeing (impacts on bullying, educational outcomes etc.)

Appendix

D

EDUCATION POLICY HISTORY IN ENGLAND

APPENDIX D – EDUCATION POLICY HISTORY IN ENGLAND

History of Education Policy in England (from 1951 till present time)

Period 1951-1970

Political welfare state. Clement Attlee's Labour government won the general election in February 1950. However, in October 1951 another election resulted in the return of a Conservative government under Winston Churchill. The Tories were to remain in power for thirteen years under prime ministers Anthony Eden (1955-57), Harold Macmillan (1957-63) and Alec Douglas-Home (pronounced 'Hume') (1963-64). In October 1964, after 13 years of Conservative government, Harold Wilson led the Labour Party to a general election victory. Wilson lost power in June 1970 when Ted Heath's Tories won the election.

Socio-economics. The period was one of low unemployment, relative economic prosperity, and optimism though there were problems with the country's external balance of payments. Wilson was anxious to increase opportunity within society. In the education system this meant change and expansion: for the first time ever, a British government spent more on education than on defence. There was a significant increase in the number of university places, with more women undertaking higher education courses. But Wilson's record on secondary education was disappointing: while the proportion of children attending comprehensive schools rose to thirty per cent during this period, his government failed to establish a fully comprehensive system and selection survived.

Around the world, selective education systems were being replaced with comprehensive ones. The Scandinavian countries and Japan had begun the process immediately after the war; Israel and most of Europe followed; New Zealand and Canada continued with the reforms they had started before the war; Eastern Europe adopted the common school model of the Soviet Union. Yet in Britain, the Conservatives seemed determined not to notice what was going on elsewhere. Their commitment to grammar schools and their lingering doubts about the benefits of mass education were backed by various conservative commentators (Gillard, 2011).

Criticism of the selection process was growing - as was parental dissatisfaction with the system, especially among the middle classes. Benn and Chitty cite that *"the middle class was expanding and grammar schools were not"* (Benn and Chitty, 1997).

The selection system was perceived as failing because:

- research cast doubt on theories of inherited intelligence;
- there were many errors in school placements due to fallibility of the selection mechanism;
- there was a great deal of inequality in outcome - the level of provision of grammar school places ranged from 10 per cent in some LEAs to more than 30 per cent in others;
- there was a great deal of gender inequality - many LEAs had single-sex grammar schools with far more places for boys than for girls;
- talent was being wasted as many children left school too early - a view reinforced by the Newsom Report.

When Labour won a bigger majority in the 1966 general election with a clear mandate, many hoped the new government would require all LEAs to go fully comprehensive. In fact, four years were to pass before a bill was drafted and, when Labour lost the 1970 general election, the bill was lost too.

Education provision. One in five schools in England were destroyed or badly damaged in the Second Word War. Planning for new schools began in 1943 and led to a reorganisation of secondary education in 1944. England's post-war state schools received a relatively high level of funding compared with hospitals and other public buildings. What was not recognised was that the birth rate had begun to rise dramatically, and only declined from the mid-1960s (Harwood, 2010). The Ministry of Education in 1943 recommended the use of standardised prefabricated components and, following expenditure cuts in 1949, committed every Local Authority to a three year building plan that was carefully costed (Board of Education, 1944). Secondary education provision in England and Wales at the time was as follows:

No. of schools:	No. of children in education:
Secondary modern schools	3,906
Grammar schools	1,298
Direct grant grammar schools	179
Technical schools	186
Bi- and Multi-lateral schools	69
Comprehensive schools	195
Other secondary schools	240
All-age schools	411

Table 1 – Provision of secondary education in England and Wales in 1964
Statistics of Education (1964); Wo (1966)

During the 1960s, a number of LEAs chose to change their school systems from two-tier (primary and secondary) to three-tier (first or lower schools, middle schools, upper schools).

When Churchill had come to power in 1951 he had immediately cut spending on education. But in the ensuing years the Tories accepted the notion that increased investment in education led to national economic growth, and public expenditure on education rose from 3 per cent of Gross Domestic Product (GDP) in 1953-4 to 4.3 per cent in 1964-5. As a result, there had been huge improvements in educational provision since the end of the war. 1,800 new secondary schools had been built in England and Wales, there was more variety in the curriculum, equipment and materials had improved, and there were more out of school activities.

However, children of average or less than average ability had largely missed out on this progress. A survey conducted for the Newsom Committee showed that 40 per cent were still being taught in overcrowded and inadequate school buildings (Central Advisory Council for Education, 1963). Children in slum areas were particularly badly served: 79 per cent of the schools in these areas had seriously inadequate buildings; playing fields were often some

distance away; and there were frequent changes of teaching staff. Moreover, expectations were low: they were set less homework and the curriculum they were offered was more traditional. 'The contrasts in educational provision were growing sharper' (Rogers, 1980).

Capital Investment (in education and school buildings). The figure below illustrates trends in education spending over a long time frame, from 1955–56 through to 2010–11, as well as our own projections for 2011–12 through to 2014–15. The black line charts real-terms education spending over time (relative to its level in 1955–56), while the grey line shows education spending as a share of national income. As can be seen, from the mid-1950s onwards the level of education spending grew rapidly, rising from just under 3% of national income to reach a high point of 6.4% in 1975–76 (Chowdry and Sibieta, 2011).

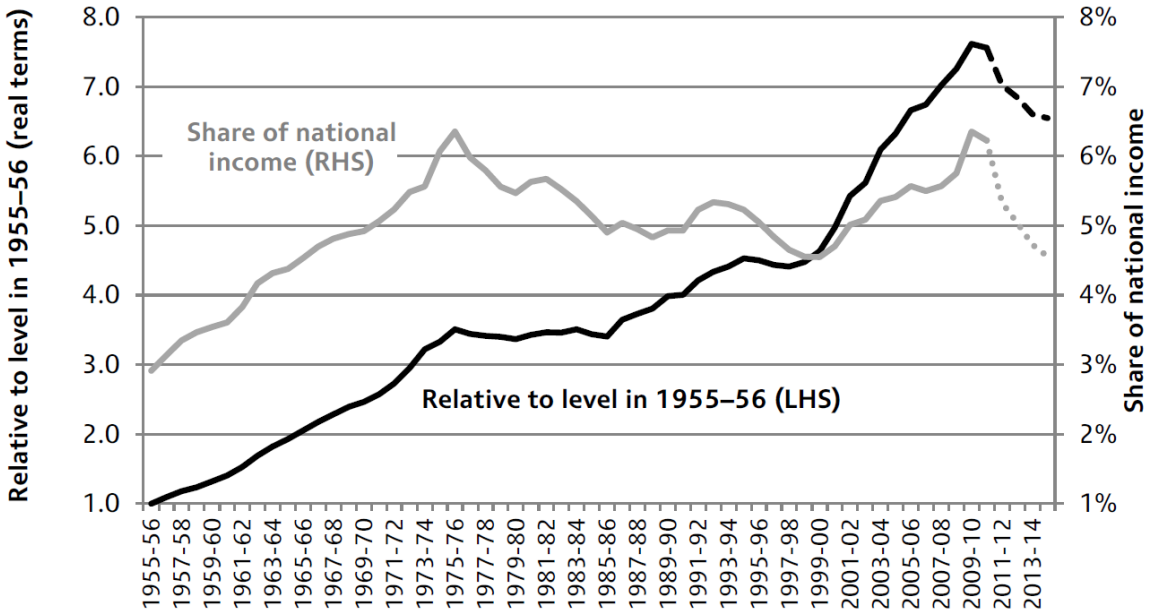


Figure 1: UK education spending (1955–56 to 2014–15, actual and forecast).
Source: Chowdry and Sibieta (2011), who refer to HM Treasury, Public Expenditure Statistical Analyses 2011; ONS Blue Book; authors' calculations using PESA.

Education spending includes spending on the early years, schools spending, further education (post-16 education outside of schools) and higher education. One can also make a distinction between current or day to-day spending (e.g. teacher pay and consumables) and capital spending (e.g. investment in new buildings and ICT).

Period 1970s

Political welfare state. The Conservative administration led by Heath needed to make cuts in public expenditure and his new secretary of state for education was Margaret Thatcher. In 1974 there were two elections. The first was inconclusive. Heath could not bring himself to promise a coalition with the Liberals so Harold Wilson formed a minority Labour administration. In February 1975 Heath was replaced as leader of the opposition Conservative Party by Margaret Thatcher. Wilson resigned in April 1976 and was replaced by Jim Callaghan. In 1976

Callaghan gave his famous Ruskin College speech in which he called for a 'Great Debate' about the nature and purposes of education. In May 1979 the election were won by Thatcher's Conservatives party (Gillard, 2011).

Socio-economics. The economic background to the period was not auspicious. The oil crisis and subsequent recession of 1971-3 'fundamentally altered the map of British politics' by exposing 'all the underlying weaknesses of Keynesian social democracy'. The post-war 'welfare capitalist consensus' had relied on increasing prosperity to foster social unity. 'When that prosperity disintegrated, so, too, did the consensus' (Chitty, 2004). The recession 'provided a rationale for economic cutbacks in education not only in England but in most advanced western industrial countries' (Galton et al., 1980).

By 1976, the Labour government was in deep financial trouble and Callaghan was pressured by the US and by the right wing of his own party to accept a loan from the International Monetary Fund (IMF). The cuts in public expenditure which were forced on him increased unemployment and worsened the provision of education and other public services. Callaghan told the Labour Party conference 'that his government was making a definitive break with the post-war past - a break that embraced not only financial policy but the social and political order that economic growth and full employment had enabled' (Jones, 2003).

Callaghan gave his 'Great Debate' speech about education at Ruskin College Oxford on 18 October 1976. Callaghan called for a public debate on education which would allow employers, trades unions and parents, as well as teachers and administrators, to make their views known. The curriculum paid too little attention to the basic skills of reading, writing and arithmetic, he said. Teachers lacked adequate professional skills and did not know how to discipline children or to instil in them concern for hard work or good manners. Underlying all this was the feeling that the educational system was out of touch with the fundamental need for Britain to survive economically in a highly competitive world through the efficiency of its industry and commerce.

Education provision. The speech was followed by various DES and HMI initiatives regarding the curriculum, the establishment of the Assessment of Performance Unit and the beginning of mass testing by LEAs. The debate was characterised by the increasingly detailed interventions of central government into schooling. The interventions began in the form of spending cuts and developed into a strategy for relating education to a large-scale programme of social and economic restructuring: the education revolution of the 1980s and '90s had its origins in the conflicts, crises and realignments of the 1970s (Jones, 2003).

The 1976 Education Act stated the principle of no selection. However, the rest of the Act hedged about this principle with so many conditions and loopholes that its effect was negligible. 'There was no legal requirement to end selection, and the Act produced no visible effect' (Benn and Chitty, 1997). The Act was repealed by the Conservatives in 1979.

State-funded secondary pupil numbers aged 16 and over have been increasing every year since the mid-1990s. Between 2010 and 2011 they rose by around 10,000, to 423,000. Between 2011 and 2013 (the latest year for which projections are available), they are projected to increase further, reaching 431,000 by 2013 (DfE, 2012b).

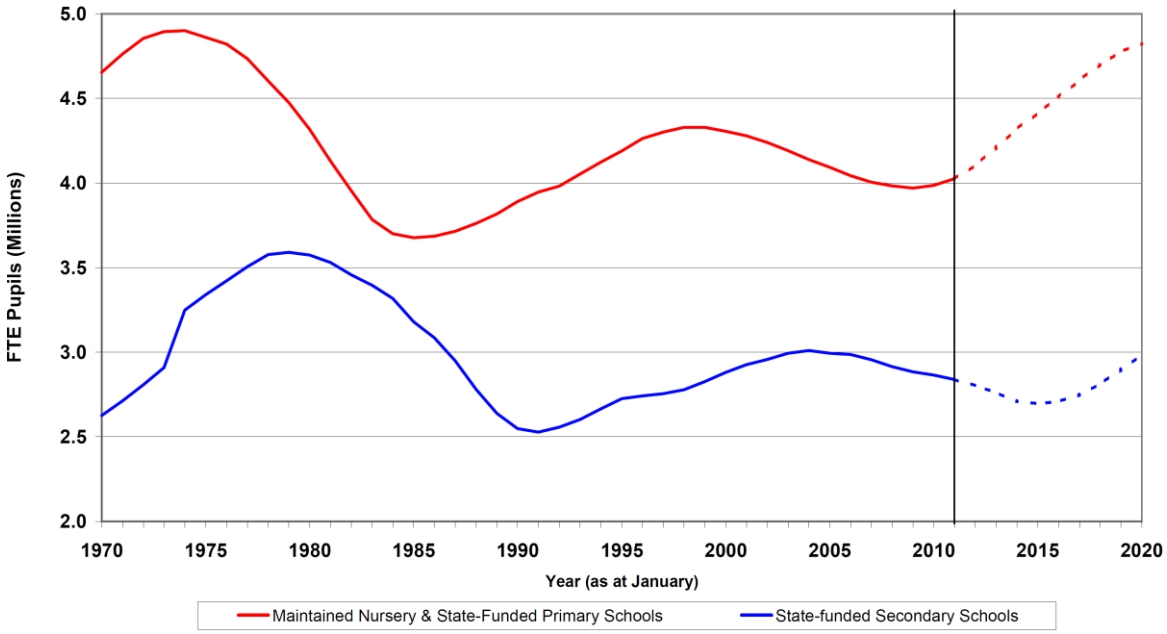


Figure 2 - State-funded schools: Full time equivalent number of pupils (aged up to and including 15) by type of school in England (DfE, 2012b).

Capital Investment (in education and school buildings). Looking back at historical trends, education spending rose from just under 3% of national income in the mid-1950s to reach a high-point of 6.0% of national income by 1975–76. However, it should be noted that growth in education spending as a share of national income up to the mid-1970s was being spread across an increasing school-age population, and thus the growth in education spending over this period overstates the growth in resources per head. Furthermore, the decline from the mid-1970s onwards coincides with a decline in the school-age population so that even though resources were declining as a share of national income and not growing as rapidly as in other periods, they were being spread across a declining number of pupils (Chowdry et al., 2010).

Period 1980s

Political welfare state. Neo-liberalism became the dominant force in British politics with the election in 1979 of the Conservative administration led by Margaret Thatcher. Her government's policies 'accelerated the closing down of unprofitable industries and promoted a profound social and economic restructuring' (Jones, 2003 , p. 107). She won a second and a third term in office at the general election in 1987. The 'iron lady' pushed ahead with some unpopular polices, most notably the introduction of a form of poll tax. But Thatcher had become increasingly unpopular and the last straw for many was her determination to introduce a form of poll tax. This led, in March 1990, to the worst riots London had seen for a century. She lost

the confidence of her colleagues and in November 1990 she was replaced as Tory leader and prime minister by John Major (Gillard, 2011). The twin aims of Margaret Thatcher's education policies in the 1980s were to convert the nation's schools system from a public service into a market, and to transfer power from Local Authorities to central government (Jones, 2003, p. 107).

Socio-economics. By 1982 the Thatcher government was highly unpopular with a soaring inflation and a massive increase in unemployment. The Thatcher government started weakening the role of the LEAs (Local Education Authorities) by dismantling the triangular framework of responsibility - central government, Local Authorities and the schools - which had been established by the 1944 Education Act, and by offering parents a greater role in the running of schools.

The LEAs were already in a difficult position. Local government had been reorganised in 1974, when the number of LEAs was reduced from 146 to 104. Many of the reorganised authorities had embraced corporate management policies which led to some widely publicised resignations of Chief Education Officers who felt they no longer had control over the service. Furthermore, after the 1974 reorganisation there was 'a tendency for local politics to consolidate along national party lines' (Shipman, 1984, p. 49). In the 1980s, public spending was being cut and the differences between the spending of different LEAs widened. As contraction replaced expansion, power tended to ebb back to central government.

Education provision. The Education Reform Act (29 July 1988) was the most important Education Act since 1944. It is sometimes referred to as 'The Baker Act' after secretary of state Kenneth Baker. The Act was presented as giving power to the schools. In fact, it took power away from the LEAs and the schools and gave them all to the secretary of state - it gave him hundreds of new powers. It took a public service and turned it into a market - something the Tories had been working towards for a decade. Chitty and Dunford (1999, p. 25) argue that the 'meretricious agenda' of the 1988 Act was in many ways 'a tribute to the remarkable resilience of the comprehensive ideal'.

The Act's major provisions concerned:

- the curriculum:
  - the National Curriculum
  - new rules on religious education and collective worship
  - the establishment of curriculum and assessment councils;
- admission of pupils to county and voluntary schools;
- local management of schools;
- grant maintained schools;
- city technology colleges;
- changes in further and higher education; and
- the abolition of ILEA

The National Curriculum which resulted from the Act was written by a government quango: teachers had virtually no say in its design or construction. It was almost entirely content-based. Dennis Lawton, of the University of London Institute of Education, described it as the reincarnation of the 1904 Secondary Regulations. Another result of the Act was the Local Management of Schools which dramatically changed the role of the head teacher and governors. The head was no longer an educationalist but an institutional manager. S/he now had to learn about recruitment and selection procedures, employment law, health and safety legislation, buildings maintenance etc. This decade also opened up the introduction of Grant-Maintained Schools, City Technology Colleges (pre-cursor to Academies and later Free Schools).

Capital Investment (in education and school buildings). From the mid-1970s through to the mid-1980s, education spending was largely constant in real terms. This was then followed by real-terms growth up until the late 1990s. However, over the period from the mid-1970s through to the late 1990s, there was a gradual decline in education spending as a share of national income, so that it reached around 4.5% of national income by the late 1990s. There are two notable exceptions to this pattern: during the recessions of the early 1980s and early 1990s, education spending temporarily rose as a share of national income as a direct result of the concurrent reductions in national income (Chowdry and Sibieta, 2011).

Period 1990s

Political welfare state. When John Major became Tory leader and prime minister in November 1990, he inherited from Thatcher an education system which had suffered a massive decline in investment and a vast increase in inequality. The Major administration was equally committed as its Thatcher predecessor to selection and elitism; equally determined to continue undermining the Local Authorities; and equally destructive in its attitude to the teaching profession

During their eighteen years in office, the Tories had weakened the power of the Local Authorities, diminished the influence of the teacher unions and forced the Labour Party to rethink its education policies. But these successes (from their point of view) had encouraged them to ever greater extremism, notably in their promotion of selection and their right-wing vision of 'traditional' education (Jones, 2003, p. 122). Following the election, John Patten replaced Clarke as education secretary and the Department of Education and Science (DES) was renamed the Department for Education (DfE).

Socio-economics. Public expenditure on education as a percentage of GDP had reached a high point of 6.5 per cent in 1975-6 under Callaghan's government. By 1983-4 it had fallen to 5.3 per cent and it remained below that level under both Thatcher and Major. By 1993-4 capital spending on schools was less than half what it had been in the mid-1970s (figures from Glennerster, 1998, p. 37, quoted in Jones, 2003, p. 112). To make matters worse, schools faced huge problems caused by increasing social polarisation. When Thatcher had come to

power in 1979 about ten per cent of children lived in households whose income was less than half the national average. By 1993, the figure was 33 per cent (figures from Oppenheim and Lister, 1997, p. 24, quoted in Jones, 2003, p. 112). In 1997 Ofsted noted that state schools with large numbers of children from poor homes were by far the worst performers at GCSE.

Education provision. Patten was keen to undermine the comprehensive system but he realised that public support for comprehensive schools was a problem - one which even Thatcher had been unable to solve. There had been widespread parental opposition to the reintroduction of selection in the wake of the 1979 Education Act, which allowed LEAs to maintain selective systems. Her response to this opposition had not been hugely successful: few schools had chosen to adopt grant-maintained status and few firms had agreed to sponsor city technology colleges. So Major and Patten now sought other means to damage the comprehensive system and weaken local authority control of education. Their strategy was to convert 'selection' into 'specialisation' (Gillard, 2011).

The 1992 Education (Schools) Act made provision for the establishment of Ofsted (the Office for Standards in Education). The agency was to employ private contractors to inspect schools and its reports on individual schools would be published. Morale among teachers suffered when government ministers began using Ofsted reports as a basis for 'naming and shaming' so-called 'failing' schools.

Capital Investment (in education and school buildings). Investment in preventive maintenance and improvement of school buildings had been neglected in many Local Authorities throughout the 1980s and most of the 1990s. Schools began to pay the price for this situation, as problems with leaking roofs, failing heating systems, deteriorating temporary buildings and external woodwork accumulated. In some schools these problems reached crisis level during the 1990s.

Since 1997, the government has substantially increased capital investment in new and refurbished school buildings. Pupils, parents and staff are benefiting from the improved quality of many school buildings. The framework for asset management planning is also improving the information that is recorded about school buildings and, hence, the ability of local education authorities (LEAs) and schools to plan and use the increased investment wisely (Audit Commission, 2003).

Period 2000s

Political welfare state. The election of the first Labour government for eighteen years, was led by Tony Blair. With the Tories still in meltdown mode, New Labour won another landslide victory in the general election in June 2001. New Labour won a historic third term in office at the general election in May 2005, though with a much reduced majority in the Commons. For the first time ever in a British election, the winning party gained fewer votes than the number of people who didn't vote at all. Tony Blair was replaced as prime minister by former chancellor

of the exchequer Gordon Brown. His new administration immediately announced that the education department would be split in two: the Department for Children, Schools and Families (DCSF) with Ed Balls as secretary of state, and the Department of Innovation, Universities and Skills (DIUS) under John Denham.

The two main themes of his first term - an increase in selection under the guise of specialisation, and the promotion of privatisation - would be taken further in his second term and would be joined by a third theme - a determination to increase the involvement of the churches and other religious groups in educational provision.

Following the election, Estelle Morris took over from David Blunkett as Secretary of State and the Department for Education and Employment (DfEE) was renamed the DfES (Department for Education and Skills), and later again to DCSF. In 2007, the new children's secretary Ed Balls introduced legislation to raise the school leaving age to 18, improve school discipline, remove barriers to further expansion of the academies programme, and give teachers more scope to decide when pupils should be tested.

Socio-economics. Public spending on education in the UK grew rapidly during the 2000s. Over the decade between 1999–2000 and 2009–10, it grew by 5.1% per year in real terms, the fastest growth over any decade since the mid-1970s. As a result, it rose from 4.5% of national income in 1999–2000 to reach a high point of 6.4% in 2009–10 (Chowdry and Sibieta, 2011). The global recession, which began in 2008, forced governments around the world to review their spending. Britain was no exception. In a sign of things to come, Ed Balls urged schools to save £750m a year by turning off lights, cutting back on heating and sharing cleaners. Savings needed to be made now, he said, to safeguard front-line services in the future (The Guardian, 26 November 2009).

The message was reiterated three months later at a conference run by the NCSL, only this time heads were asked to make 'efficiency' savings of £1bn without reducing front-line staff. The government was promising a 0.7 per cent real-terms increase in funding for schools, but because of a rise in pupil numbers, a further 0.9 per cent would be needed to maintain the status quo. NAHT general secretary Mick Brookes said it would be difficult for heads to find £1bn without threatening front-line staff: teaching assistants could be particularly vulnerable (The Observer, 7 February 2010).

Education provision. The new government's education policies were set out in the white paper *Excellence in Schools*, published in July 1997. The white paper made it clear that the Conservative policy of 'selection by specialisation' would be pursued. It said: "*We will ensure that schools with a specialism will continue to be able to give priority to those children who demonstrate the relevant aptitude, as long as that is not misused to select on the basis of general academic ability*" (DfEE, 1997, p. 71). Blair's New Labour government was not abolishing selection - it was actually extending it. The white paper said that the: *"demands for*

equality and increased opportunity in the 1950s and 1960s led to the introduction of comprehensive schools. All-in secondary schooling rightly became the normal pattern, but the search for equality of opportunity in some cases became a tendency to uniformity. The idea that all children had the same rights to develop their abilities led too easily to the doctrine that all had the same ability. The pursuit of excellence was too often equated with elitism" (DfEE, 1997, p. 11).

The government began introducing private contractors around 2000 into other bits of the education service. Various 'failing' Local Authority services were put out to tender (as in Hackney and Islington) and even schools were handed over to private companies. King's Manor School in Guildford was the first. The privatisation of education took a major step forward in March 2000 when David Blunkett announced that the government intended to create a network of 'city academies' - effectively private schools paid for by the state - closely modelled on the 'charter schools' in the US and the Conservatives' city technology colleges. The 'city' was soon dropped to allow for the creation of rural academies.

In September 2001, the white paper *Schools - achieving success* was published. The government's five-year plan, published in July 2004, formed the basis for its next education white paper. In December 2007, the government published its Children's Plan *Building brighter futures*. This important and ambitious document was based on widespread consultation involving children, young people, parents, teachers and policy makers, and was designed to underpin and inform all future government policy relating to children, their families and schools. It aimed to eradicate child poverty and reduce illiteracy and antisocial behaviour by 2020. In his Foreword, Ed Balls said he wanted to make Britain *'the best place in the world for our children and young people to grow up'* (DCSF, 2007, p. 3). The latest Education Act amendment was released in 2008. Until 2007 the Department for Education and Skills was responsible for the education services in England.

Capital Investment (in education and school buildings). Since the late 1990s, education spending has risen substantially. Between 1999–2000 and 2009–10, education spending rose from 4.5% to 6.4% of national income; it then fell back slightly to 6.2% of national income in 2010–11. During the global financial crisis, education spending increased as a share of national income. This partly results from the sharp drop in national income, but it also reflects continued growth in the real-terms level of education spending (Chowdry and Sibieta, 2011).

The Table 2 below shows the average growth across these components of education spending between April 1998 and March 2009 (for England only). This is the most recent, consistent breakdown in spending by sector that is currently available over a long time frame. Schools spending is broken down into current and capital spending, and current spending is detailed separately for under-5s, primary schools and secondary schools (Chowdry and Sibieta, 2011).

	Average annual real increase, April 1998 to March 2009
Education (England only)	5.2
Schools, of which:	5.6
Capital spending	12.9
Current spending, of which:	5.0
Under-5s	6.1
Primary schools	3.9
Secondary schools	5.0
Further education	7.7
Higher education	2.3
Other education spending	5.6

Table 2 - Increases in various components of public spending

Source: Department for Children, Schools and Families, Departmental Report 2009. Original figures published in 2007–08 prices using March 2009 GDP deflators.

The component that saw the fastest growth over the period was schools capital spending (12.9% per year). In February 2004, the government announced Building Schools for the Future (BSF), a massive school rebuilding programme. More than £45bn would be spent rebuilding or refurbishing every secondary school in England within 15 years. The programme would be financed partly from public funds and partly using the Private Finance Initiative (PFI).

Balls launched the 'National Challenge' on 10 June 2008, with funding of £400m. Its target was that at least thirty per cent of pupils in each secondary school should achieve a minimum of five A*-C grade GCSEs including English and maths by 2011. It aimed to tackle 'the link between deprivation and attainment' and offered 'targeted help for teaching and learning', support to develop strong leadership, the flexibility to design 'local bespoke solutions' and 'more radical changes' such as the setting up of academies and National Challenge Trusts 'where this would benefit the school'.

By 2009, academies were seen by both Labour and the Conservatives as the future of education. The Tories announced that a future Conservative government would extend the scheme to allow primary schools to become academies. Gove's other big idea is to establish up to 2,000 Swedish-style 'free schools' - independent schools run by or for parents but paid for by the state. He had first proposed these in September 2008. *"We have seen the future in Sweden and it works"*, he declared. *"Standards have been driven up. If it can work there, it can work here"*.

Period 2010s and present time

Political welfare state. The general election was held on Thursday 6 May 2010. There was no overall winner, and after several days of negotiations between the parties, Gordon Brown resigned on 11 May and the Queen invited David Cameron to form a coalition government of Tories and Liberal Democrats. A new UK Government took office on 11 May 2010 and the name of Department was changed to the Department for Education (DfE) - as it was between

1992 and 1995 - with Michael Gove (Conservative) as the Secretary of State for Education and Sarah Teather (Liberal Democrat) and Nick Gibb (Conservative) as Ministers of State.

Socio-economics. The new government warned that education would not be exempt from the savage cuts in public expenditure it was planning. A month after coming to power, ministers announced a £359m programme of education cuts (The Guardian, 7 June 2010). By the beginning of July, the government was talking about cuts of up to £3.5bn in the schools budget as part of the most drastic public spending squeeze since the Second World War (The Guardian, 5 July 2010). The biggest budget cuts affected the schools rebuilding programme. Within days of coming to power, the government began a review of New Labour's ambitious BSF programme. Plans for the rebuilding or refurbishment of hundreds of secondary schools were put on hold. The Department insisted that no firm decision had yet been made, but it was clear that there would be a concerted drive to make savings from the £8.5bn annual budget for new schools, and that some of the money would be used to fund Gove's 'free schools' (The Guardian, 14 May 2010). In early July 2010 Gove cancelled BSF.

Education provision. The Department for Education is focusing on the following priorities:

- Giving greater autonomy to schools (using the Academies programme, and initiatives such as Free Schools, University Technical Colleges and Studio Schools);
- Improving parental choice;
- Offering more support for the poorest;
- Whole system improvement;
- Great quality provision for children;
- reform the National Curriculum.

The DfE have published a White Paper in November 2010, The Importance of Teaching, setting out the details of their commitments. In addition, the Education Act 2011 was approved on 15 November 2011.

Capital Investment (in education and school buildings). A study on trends in education and schools spending concludes that following the historically large increases in education spending over the 2000s, large cuts to education spending are now planned for the period covered by the 2010 Spending Review. By 2014–15, education spending is expected to fall to its lowest level since the mid-1990s. However, the cuts planned to the DfE's budget are similar to the average planned across government as a whole. However, the cuts will not be shared equally across all areas of education spending. The resource budget for schools has been relatively protected. The most substantial cuts will be made to higher education and schools capital spending, followed by planned cuts to 16–19 education spending and to early years and youth services spending (Chowdry and Sibieta, 2011).

The New Labour government had opened 203 academies and planned to increase that number to 400. Michael Gove was determined to go much further. In his first month as education secretary, he wrote to all primary and secondary schools in England inviting them

to become academies. Furthermore, he declared that he had 'no ideological objection' to businesses making profits from the new generation of academies and free schools. Gove was also determined to press ahead with the creation of thousands of 'free schools', a policy he had made much of during the election campaign.

Concluding remarks

In the 19th century there was hostility to the very idea of mass education and, when that argument was eventually won, the system that evolved was based on the entrenched class divisions of English society. In the first half of the 20th century the divisions continued, only now they were presented as being based on theories of intelligence rather than on social class. By the middle of the century these theories had been shown to be spurious, and in the 1960s and early 1970s it looked as though, finally, England might get a truly comprehensive public education service. But since 1976 (when Callaghan started the 'Great Debate') the trend has been back to division and elitism. Thatcher and Major sought to replace public service with market forces. Blair created more division with academies and faith schools, and micromanaged the teaching process itself. Under Gordon Brown, Ed Balls tried to take a holistic view of the needs of children but refused to undo the damage done by his predecessors. Cameron and now May, are determined to end Local Authority control by turning every school into an Academy.

	Average annual real increase
Labour	
Labour years: April 1997 to March 2010	+4.2
Labour 1: April 1997 to March 2001	+2.9
Labour 2: April 2001 to March 2005	+6.2
Labour 3: April 2005 to March 2010	+3.8
Conservative	
April 1979 to March 1997	+1.5
Long-run trend	
April 1956 to March 1997	+3.7
Projected under Spending Review 2010	
April 2010 to March 2015	–3.5

Table 3 - Increases in UK education spending

Sources: HM Treasury, Public Expenditure Statistical Analyses 2011; previous PESAs; ONS Blue Book; GDP deflators from OBR, Economic and Fiscal Outlook, March 2011.
Url: http://budgetresponsibility.independent.gov.uk/economic-and-fiscal-outlook-march-2011/

Looking ahead, education spending will almost certainly fall in real terms during the period covered by the 2010 Spending Review. Studies by Chowdry and Sibieta (2011) show it will fall by 3.5% per year in real terms between 2010–11 and 2014–15, or 13.4% in total over the four years. This would be the largest fall in education spending over a four-year period since at least the 1950s. If these forecasts are realised, then education spending as a share of national income will fall from 6.2% in 2010–11 to 4.6% by 2014–15. This would return it to a level last seen in 1999–2000, which in turn was the lowest level since the mid-1960s.

Despite the difference between the overall rate of growth of education spending delivered by the last Labour government and that under the coalition government, there is actually a remarkable similarity in the two governments' apparent relative priorities. Common to both records on education spending is a shift in public spending away from higher education and towards schools. One key difference is that, while schools capital spending was the fastest-growing component of education spending under Labour, it is due to receive the largest cut under the Conservatives government.

Every era has had their careful studies of school environments, and every era has had technological innovations, and every era has had the goal of making better, more delightful learning environments for young people. New schools are neither the first nor the last in this line. In light of this, it may be safest to move forward with caution, looking to Post Occupancy Evaluations (POE) to provide holistic and comprehensive feedback on newer design trends. A critical review of the research findings might help to question the extent to which they are critically assessing progress rather than simply supporting the philosophies of the day. Have school facilities improved in the past century? In some ways, they certainly have. But in other ways, especially in the craft and science of natural lighting and conditioning, they may have simply circled back to where they started. These patterns are largely reflections of the greater societal and technological trends of the 20th century.

Appendix

E

PROCUREMENT POLICY FOR LEPs

1. Original LEP Procurement Process
2. Competitive Dialogue Procedure for LEPs

APPENDIX E2 - COMPETITIVE DIALOGUE FOR LEPs

The literature used for this Appendix is extracted from the Guidance note: “An Introduction to Building Schools for the Future“ (4ps and PfS, 2008)

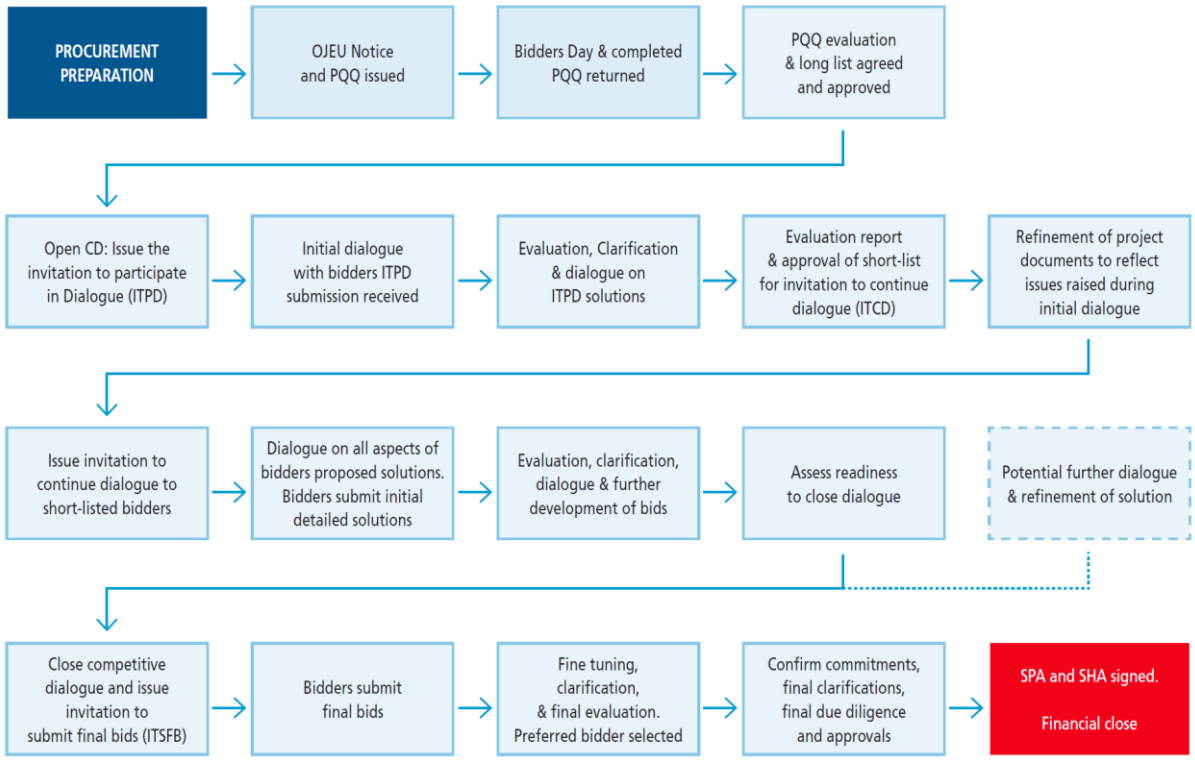


Figure 1 - The Standard BSF Procurement Process through Competitive Dialogue
Source: 4ps and PfS (2008)

Competitive Dialogue is the procedure used to procure ‘particularly complex projects’ and is judged to be the appropriate procurement route for BSF projects. The procurement begins with an OJEU notice (Official Journal of the European Union) and a pre-qualification stage. Bidders selected following the pre-qualification stage are invited to participate in a dialogue and are informed of the criteria against which they will be evaluated.

The dialogue phase enables the Local Authority to have discussions with bidders with the aim of identifying and defining the solution (including price) best suited to meet the Local Authority’s needs. The dialogue may take place in successive stages to reduce the number of solutions discussed and bidders involved. At each stage the evaluation criteria will be applied, against which bidders will be judged. Once the required solution has been identified and issues relating to risk and price have been determined, the Local Authority declares the dialogue to be concluded. No negotiation can take place after close of dialogue.

Bidders remaining at the end of the dialogue are invited to submit final tenders based on the solution(s) identified (invitation to submit final bids (ITSFB) ‘call for final bids’). Final tenders can be ‘clarified, specified and fine tuned’ provided that this does not change the basic features of the tender (no changes are permitted which are likely to distort competition or have a discriminatory effect).

Once a Selected Bidder has been identified, there is a further opportunity to clarify aspects of the tender or confirm commitments provided, again, so long as there are no substantial changes to the tender and that this does not risk distorting competition or causing discrimination. There can be no negotiations at this stage.

Appendix

F

TYPICAL RISKS

1. Typical Risks in BSF Projects
2. Typical Risks in PPP/PFI Projects

APPENDIX F1 – TYPICAL RISKS IN BSF PROJECTS

Extracted from: BSFI (2011), Information Memorandum – Project Pass, Building Schools for the Future Investments LLP

Typical LEP Risks

The tables below provide an overview of the allocation of key risks relating to the SPAs, the LEP's investments in PFI SPVs, the D&B Contracts, ICT Contracts and Non-PFI FM Contracts.

To the extent that any LEP risks do materialise, then this may have an impact on the ability of the LEPs to distribute returns attributable to the indirect interests in PFI Projects held through these LEPs.

1. Strategic Partnering Agreement

Risk	Primary bearer(s)	Summary assessment
Revenue risks		
Payment of balance of LEP Initial Set-Up Costs	Local Authority (LA)	To the extent that the LEP has not entered into new projects during the first five years of the SPA and has not recovered the LEP Initial Set-up Costs, then the Local Authority (LA) will pay to the LEP the balance of any such unrecovered costs.
Rates for Partnering Services	LEP or Partnering Service Provider	The LEP costs in providing the Educational Support Services and the Additional Services will be reimbursed against an agreed schedule of rates. Depending on how the LEP is structured, the LEP will either bear the risk that the agreed fees are adequate or pass this risk to a sub-contractor appointed by the LEP for the delivery of the Partnering Services
Suspension or removal of exclusivity	LEP	In certain default situations, including where the LEP commits and fails to remedy a "Significant Performance Failure" (measured against target level key performance indicators), the LA has the right to suspend or remove the exclusivity rights of the LEP to deliver the Partnering Services for the project and/or all future new projects.
Cost risks		
of Partnering Services	LEP or Partnering Service Provider	Depending on the structure adopted for the individual project, the LEP will either deliver the Partnering Services itself or sub-contract them to a Partnering Service Provider.

Table 1 - Typical allocation of key risks under Strategic Partnering Agreement

2. LEP investments in PFI SPVs

Risk	Primary bearer(s)	Summary assessment
Revenue risks		
Adequacy of Project Management Fee	LEP	The Project Management Fee is paid to the LEP by the PFI SPV upon financial close. The PFI SPV will then include this in its cost structure, and the LA will pay for it over the life of the PFI Project. The LEP bears the risk of the adequacy of the fee amount to meet (i) the agreed portion of the Strategy for Change development costs, (ii) the project specific development costs, (iii) the agreed portion of the LEP set up costs, and (iv) the LEP Margin.

Risk	Primary bearer(s)	Summary assessment
Payment and adequacy of LEP Management Services Fee	LEP	The LEP Management Services Fee is charged by the LEP to the PFI SPV on a monthly basis to cover the running costs of the LEP in administering and providing management services to the PFI SPVs and a margin charged on the LEP running costs. The LEP bears the risk of the adequacy of the fee amount and the risk of non-payment by the PFI SPV.
Shareholder returns	LEP	The LEP bears the risk that the PFI SPV makes sufficient profit to make shareholder distributions to the LEP.
Cost risks		
Management Services	LEP	As indicated above, the LEP bears the risk of the Management Services Fee being adequate to cover the management services provided to the PFI SPV.

Table 2 - Typical key LEP risks in respect of PFI SPV investments

3. D&B Contracts

Risk	Primary bearer(s)	Summary assessment
Revenue risks D&B		
Adequacy of Lump Sum Option	D&B contractor	If the Lump Sum Option is used, then the D&B contractor bears the risk that the agreed lump sum payment is adequate.
Adequacy of Target Cost Option	LA, D&B contractor	If the Target Cost Option is used, then the LA bears the risk of the actual cost subject to a guaranteed maximum price above which the D&B contractor bears the risk.
Delay in payment of LEP Margin	LEP	The LEP Margin is paid upon certification of the final certified milestone. The LEP bears the risk of late payment if the works are delayed.
Adequacy of Project Management Fee	LEP	The Project Management Fee is paid upon execution of the D&B Contract. The LEP bears the risk of the adequacy of the fee amount to meet the agreed portion of the LEP set up costs and the project development costs.
Cost risks		
Title	LA	Risk of title to the sites remains principally with the LA on the basis that the LA has disclosed all relevant title matters and search results to the D&B contractor. The D&B contractor takes title risk in relation to disclosed title matters unless expressly set out otherwise.
Site condition (including contamination)	D&B contractor	Site condition risk is passed to the D&B contractor. Relief may be given for areas under existing buildings where it is not practical for a survey to be undertaken.
Planning and consents	LA, D&B contractor	The D&B contractor is responsible for obtaining all necessary consents and satisfying all planning conditions other than those consents and planning conditions which have been identified as those which can only be obtained/satisfied by the LA.
Latent defects and asbestos	LA, D&B contractor	The D&B contractor is responsible for latent defects and asbestos risks to the extent that they have been identified in the pre-contract surveys. The LA is responsible to the extent that they have not been identified in the pre-contract surveys or should have been identified in the pre-contract surveys if they had been carried out by a competent surveyor.
Fossils and antiquities	LA, D&B contractor	Following the discovery of fossils and antiquities, the D&B contractor is required to carry out any instructions issued by the LA. However, if any instruction involves suspension of the works or the carrying out of works which are not required by law then the LA will be responsible for the cost and programme implications.
Compliance with Facilities Requirements	D&B contractor	The D&B contractor is responsible for ensuring that its proposals are consistent with the facilities requirements.
Delays to the construction programme	D&B contractor	If there is a delay in the construction programme then the D&B contractor will be responsible for paying liquidated damages to compensate the LA or it may be required to provide alternative accommodation at its own cost.
Increase in construction costs	D&B contractor, LA	Where the Lump Sum Option is used, then subject to any agreed relief (for example, the allocation of risk for latent

Risk	Primary bearer(s)	Summary assessment
		defects), the D&B contractor bears the risk of any increase in the cost of delivering the works over the fixed price. Where the Target Cost Option is used, then subject to any agreed relief (e.g. the allocation of risk for latent defects), the D&B contractor bears the risk of any increase in the cost of delivering the works over the guaranteed maximum price (GMP) but the LA bears the risk of any increase (and benefit of any decrease) in cost below the GMP.
Snagging / defects	D&B contractor	The D&B contractor will be responsible for correcting any snagging items following issue of the completion certificate. The D&B contractor will also remain responsible for claims in respect of defects in the works.
Supervening events	LA, D&B contractor	The risk for delivering the works and services is passed down to the D&B contractor. To the extent that the LA grants any relief in respect of supervening events, then the same relief is passed to the D&B contractor.
Indemnities	D&B contractor	The risk of indemnity claims for personal injury, property damage or third party claims arising from the performance or non-performance of the works or services is passed to the D&B contractor. The D&B contractor is also responsible for claims relating to breach of statutory duty, but this liability may be capped.
Insurance – requirement to maintain	LEP	The LEP retains the responsibility for taking out and maintaining the project insurances.
Insurance – uninsurable risks	LA	The LA provides relief if a risk becomes uninsurable.
Insurance – increases in insurance premia	LA, LEP	If the insurance premia increase then the LEP is responsible up to a specified level and the LA is responsible above that level.
Sub-contract risks		
Sub-contract counterparty	LEP	The LEP takes the risk of the performance and creditworthiness of the D&B contractor. However, it should be noted that performance under the sub-contract will usually be supported by parent company guarantees.
Equivalent project relief provisions	LEP, D&B contractor	The LEP will usually include equivalent project relief protections in its sub-contracts so as to ensure that it is only required to grant relief to a sub-contractor to the extent that it has received equivalent relief under the top contract. However, there are doubts as to the legality of these provisions.
Disputes mismatch	LEP	The D&B Contract does not allow for full joinder of disputes under the sub-contracts. The LEP is therefore exposed to the risk of a mismatch in the outcome of disputes between the top contracts and sub-contracts.
Limitations on liability	LEP	Any pass-down of risk/responsibility by the LEP to the D&B contractor remains subject to applicable time and/or monetary limits on liability.

Table 3 - Typical allocation of key risks under D&B Contracts

4. ICT Contracts

Risk	Primary bearer(s)	Summary assessment
Revenue risks		
Adequacy of and delay in payment of ICT Implementation Charges	ICT contractor	The implementation charges are paid in three milestone payments following (i) satisfactory completion of the implementation testing, (ii) two months of satisfactory operations and (iii) successful implementation testing of the wide area network.
Adequacy of ICT Service Charges	ICT contractor	The payment will be made monthly in arrears and will be subject to deductions arising from availability and/or performance failures in accordance with the payment mechanism.
Cost risks ICT services		
Delivery of ICT Implementation	ICT contractor	The ICT Contractor is responsible for ensuring that the ICT assets meet the required specification. The ICT Contract contains provisions dealing with delay, compensation, relief similar to those contained in the PFI Project Agreement.

Risk	Primary bearer(s)	Summary assessment
		It should be noted that completion of the D&B works under the PFI Project Agreement will usually be conditional upon completion of the ICT implementation under the ICT Contract. This risk is usually wrapped by the PFI D&B contractor.
Delivery ICT Operational Services	ICT contractor	As stated above, the delivery of the ICT Operational Services will be subject to deductions arising from availability and/or performance failures in accordance with the payment mechanism.
Insurance	LEP	The LEP is usually responsible for the insurance of the ICT assets.
Theft, loss and damage	LA	At a PFI school, the LA is responsible for loss and damage during the school day or if the asset is taken off-site. At a D&B school, the LA is responsible at all times. The ICT contractor retains responsibility for damage which it has caused or contributed to or which arises from fair wear and tear.
Indemnities	ICT contractor	The risk of indemnity claims for personal injury, property damage or third party claims arising from the performance or non-performance of the works or services is passed to the ICT contractors. The ICT contractor is also responsible for claims relating to breach of statutory duty, but this liability may be capped.
Limits on liability	LA	The LA bears the risk of liabilities above the agreed limits on liability.
Sub-contract risks		
Sub-contract counterparty	LEP	The LEP takes the risk of the performance and creditworthiness of the ICT contractor. However, it should be noted that performance under the sub-contract will usually be supported by parent company guarantees.
Equivalent project relief provisions	LEP, ICT contractor	The LEP will usually include equivalent project relief protections in its sub-contracts so as to ensure that it is only required to grant relief to a sub-contractor to the extent that it has received equivalent relief under the top contract. However, there are doubts as to the legality of these provisions.
Disputes mismatch	LEP	The ICT Contract does not allow for full joinder of disputes under the sub-contracts. The LEP is therefore exposed to the risk of a mismatch in the outcome of disputes between the top contracts and sub-contracts.
Limitations on liability	LEP	Any pass-down of risk/responsibility by the LEP to the ICT contractor remains subject to applicable time and/or monetary limits on liability.

Table 4 - Typical allocation of key risks under ICT Contracts

5. Non-PFI FM Contracts

As there is no standard form FM contract, the form of these contracts (and the scope of the FM services to be provided) can vary significantly from project to project. As is the case with the D&B Contracts and ICT Contracts, there is usually a full pass down of the risks under the Non-PFI FM Contract from the LEP to the sub-contractor delivering the service (although in certain projects the obligation to procure the required insurances is retained by the LEP). Any such pass down remains subject to the sub-contract risks which apply in respect of all LEP sub-contracts (for example, the risk of disputes mismatch or limitations on sub-contractor liability) - see sections 3 and 4 above.

6. Typical PFI risks

As outlined in the table below, PFI Projects are generally structured so that substantially all risks and obligations are passed down from the PFI SPV project entity to the subcontractors such as D&B contractors and FM providers. The risks summarised below are based on the Standard Form PFI Project Agreement and a typical allocation of risk under the sub-contracts.

Risk	Primary bearer(s)	Summary assessment
Unitary charge		
PA counterparty	PFI SPV	The PFI SPV bears the counterparty risk with respect to the LA.
Demand	LA	The LA is required to pay the unitary charge regardless of the level of usage of the facilities.
Availability	PFI FM contractor	The PFI FM contractor is responsible for ensuring that the facilities are available and will suffer availability and performance deductions in respect of any service failure for which it is responsible
Third party income		
Use of school	PFI SPV	The PFI SPV bears the risk of identifying and realising any revenue from third party users. Any revenue which is generated must be shared with the LA. The financial model for the project would not usually assume that the PFI SPV will generate any third party revenue. It is not unusual for Local Authorities to amend the standard form risk profile and take responsibility for identifying and realising revenue from third party users.
Adjustments to unitary charge		
Indexation	LA, FM contractor	The unitary charge paid by the LA to the PFI SPV is subject to indexation as are the payments to the PFI FM contractor. The PFI FM contractor bears the risk (subject to benchmarking/market testing protections) that its costs increase at a rate greater than the agreed indexation rate. The PFI SPV bears the risk of indexation on those costs which are not subcontracted.
Benchmarking and market testing	LA FM contractor	Any increase in the cost of the benchmarked/market tested services are shared. Where a tested service is benchmarked and the benchmarked price is either less than 95% or more than 105% of the existing price, the Unitary Charge will be adjusted to reflect the cost difference. Where a tested service is market tested and the successful tenderer's price is either higher or lower than the existing price, then the Unitary Charge will be adjusted to reflect the relevant cost difference. Any adjustment to the Unitary Charge will be passed on to the PFI FM contractor.
Termination compensation		
LA default/voluntary termination	LA	Following LA default or voluntary termination, the compensation on termination payable by the LA will include repayment of debt, equity compensation and sub-contract breakage costs as per SoPC.
PFI SPV default	PFI SPV, sub-contractors	Following PFI SPV default termination, the compensation on termination payable by the LA will be based on the retendered or fair market value of the project. To the extent that the default was caused by a sub-contractor then the PFI SPV will be able to claim against the sub-contractor for any shortfall in the value realised via the tender, subject to the sub-contractor's cap on liability as per SoPC.
Force majeure	LA	Following LA default or voluntary termination, the compensation on termination payable by the LA will include repayment of debt, partial repayment of equity and sub-contract breakage costs.
General cost risks		
Supervening events	LA, sub-contractors	The risk for delivering the works and services is passed down to the sub-contractors. To the extent that the LA grants any relief in respect of supervening events, then the same relief is passed to the sub-contractors.
Change in law – qualifying change in law	LA	The LA bears the risk for (i) discriminatory/specific changes in law and (ii) any capital expenditure which is required as result of a change in law above agreed amounts.
Changes in law – general change in law capex risk	PFI SPV, sub-contractors	The risk of capital expenditure required as a result of a change in law below the agreed amounts will usually be passed to the sub-contractors, but is sometimes retained by the PFI SPV subject to the sharing mechanism with the LA.
Changes in law – general change in law opex risk	sub-contractors	The risk of operational expenditure required as a result of a change in law will usually be passed to the sub-contractors.
Indemnities	sub-contractors	The risk of indemnity claims for personal injury, property damage or third party claims arising from the performance or

Risk	Primary bearer(s)	Summary assessment
		non-performance of the works or services is passed to the sub-contractors. The sub-contractors are also responsible for claims relating to breach of statutory duty, but this liability may be capped.
Insurance – requirement to maintain	PFI SPV	The PFI SPV retains the responsibility for taking out and maintaining the project insurances.
Uninsurable risks	LA	The LA provides relief if a risk becomes uninsurable.
Increases in insurance premia	LA, PFI SPV	Shared risk when if the insurance premia increase then the PFI SPV is responsible up to a specified level and the LA is responsible above that level.
Employment and pensions	LA, PFI FM contractor	The LA will assume liability for any costs or liabilities of the transferring employees arising prior to the transfer date. The PFI FM contractor will assume costs or liabilities arising after the transfer date. The PFI FM contractor will be responsible for ensuring that any transferring employees enjoy equivalent pension rights following their transfer.
SPV management	PFI SPV, MSA sub-contractor	The PFI SPV will be responsible for the cost of management of the PFI SPV. It will frequently sub-contract these responsibilities under a short term management services agreement ("MSA"). The MSA is a standard form PfS drafted document.
Construction risks		
Title	LA	Risk of title to the sites remains principally with the LA on the basis that the LA has disclosed all relevant title matters and search results to the cPFI SPV. The PFI SPV takes title risk in relation to disclosed title matters unless expressly set out otherwise.
Site condition (including contamination)	PFI D&B contractor	Site condition risk is passed to the PFI D&B contractor during the construction phase only. Relief may be given for areas under existing buildings where it is not practical for a survey to be undertaken.
Planning and consents	LA, PFI D&B contractor	The PFI D&B contractor is responsible for obtaining all necessary consents and satisfying all planning conditions other than those consents and planning conditions which have been identified as those which can only be obtained/satisfied by the LA.
Latent defects and asbestos	LA, PFI D&B contractor	The PFI D&B contractor is responsible for latent defects and asbestos risks to the extent that they have been identified in the pre-contract surveys. The LA is usually responsible to the extent that they have not been identified in the pre-contract surveys or should have been identified in the pre-contract surveys if they had been carried out by a competent surveyor. It is usual for the PFI SPV/PFI D&B contractor to be offered a collateral warranty from the surveyor in order to enable the private sector to take this risk.
Fossils and antiquities	LA, PFI D&B contractor	Following the discovery of fossils and antiquities, the PFI D&B contractor is required to carry out any instructions issued by the LA. However, if any instruction involves suspension of the works or the carrying out of works which are not required by law then the LA will be responsible for the cost and programme implications.
Compliance with Facilities Requirements	PFI D&B contractor	The PFI D&B contractor is responsible for ensuring that its proposals are consistent with the facilities requirements.
Delays to the construction programme	PFI D&B contractor, PFI SPV	If there is a delay in the construction programme then the sub-contractor will usually be responsible for paying liquidated damages to compensate the PFI SPV for the delay in commencement of the unitary charge payment from the LA. The liquidated damages will be subject to the PFI D&B contractor's cap on liability. The PFI SPV will bear the risk for costs above this cap. It should be noted that completion of the D&B works will usually be conditional upon completion of the ICT implementation by the LEP/ICT Contractor under the ICT Contract. This risk is usually wrapped by the PFI D&B contractor.
Increase in construction costs	PFI D&B contractor	Subject to any agreed relief (for example, the allocation of risk for latent defects), the PFI D&B contractor bears the risk of any increase in the cost of delivering the works.
Snagging / defects	PFI D&B contractor	The PFI D&B contractor will be responsible for correcting any snagging items following issue of the completion certificate. The

Risk	Primary bearer(s)	Summary assessment
		PFI D&B contractor will also remain responsible for claims in respect of defects in the works.
FM risks		
Increase in FM costs	PFI FM contractor	Subject to the indexation and benchmarking/market testing protections, the PFI FM contractor bears the risk of any increase in the cost of delivering the FM services.
Vandalism	PFI FM contractor	The LA is responsible for any damage caused during core school hours provided that the PFI FM contractor can show that it did not cause the damage, the damage is not covered by insurance, the damage does not constitute fair wear and tear and the damage did not arise as a result of the facility being used for its reasonable and proper purpose.
Utilities consumption (volume risk)	PFI SPV, PFI FM contractor	The risk in respect of the volume of utilities consumed is usually shared between the PFI FM contractor and the PFI SPV with the PFI FM contractor taking the risk up to a specified volume.
Major maintenance (life cycle)	PFI SPV, FM contractor	The risk associated with the management and adequacy of the lifecycle fund will usually remain with the PFI SPV but is sometimes passed to the FM Contractor. The cost associated with the implementation of lifecycle works awarded under the PFI FM contract will sit with the PFI FM contractor.
Handback	PFI FM contract or, PFI SPV	The PFI FM contractor is responsible for ensuring that the facilities meet the required hand-back standards on expiry of the project term. However, for those PFI Projects where the PFI SPV retains lifecycle risk, then any life cycle issues on handback will be the responsibility of the PFI SPV.
Financing		
Financing Agreements	PFI SPV	The PFI SPV is responsible for complying with the Financing Agreements and implementing any changes to the Financing Agreements (for example, if it requires additional borrowing).
Refinancing	PFI SPV	The PFI SPV bears the risk of being able to identify and realise any refinancing opportunities. The PFI SPV will be required to share any refinancing gain with the LA. Amended HMT required refinancing SOPC4 addendum drafting which contains Authority rights to require refinancing, amended sharing provisions in relation to refinancing gains etc were implemented in the relevant PFI Agreements.
Sub-contract risks		
Sub-contract counterparty	PFI SPV	The PFI SPV takes the risk of the performance and creditworthiness of the sub-contractors. However, it should be noted that performance under the sub-contracts will usually be supported by parent company guarantees.
Equivalent project relief provisions	PFI SPV, sub-contractors	The PFI SPV will usually include equivalent project relief protections in its sub-contracts so as to ensure that it is only required to grant relief to a sub-contractor to the extent that it has received equivalent relief under the Project Agreement. However, there are doubts as to the legality of these provisions.
Disputes mismatch	PFI SPV	The Project Agreement does not allow for full joinder of disputes under the sub-contracts. The PFI SPV is therefore exposed to the risk of a mismatch in the outcome of disputes between the top contracts and sub-contracts.

Table 5 - Typical risks in PFI contracts

APPENDIX F2 - TYPICAL RISKS IN PPP/PFI PROJECTS

Extracted from: L. Bing et al. (2015) *The allocation of risk in PPP/PFI construction projects in the UK*, International Journal of Project Management (23) pp 25–35. Url: http://dx.doi.org/10.1016/j.ijproman.2004.04.006

Categorised catalogue of PPP/PFI project risk factors

Risk meta-level	Risk factor category group	Risk factor
Macro level risks	Political and government policy	• Unstable government • Expropriation or nationalisation of assets • Poor public decision-making process • Strong political opposition/hostility
	Macroeconomic	• Poor financial market • Inflation rate volatility • Interest rate volatility • Influential economic events
	Legal	• Legislation change • Change in tax regulation • Industrial regulatory change
	Social	• Lack of tradition of private provision of public services • Level of public opposition to project
	Natural	• Force majeure • Geotechnical conditions • Weather • Environment
Meso level risks	Project selection	• Land acquisition (site availability) • Level of demand for project
	Project finance	• Availability of finance • Financial attraction of project to investors • High finance costs
	Residual risk	• Residual risks
	Design	• Delay in project approvals and permits • Design deficiency • Unproven engineering techniques
	Construction	• Construction cost overrun • Construction time delay • Material/labour availability • Late design changes • Poor quality workmanship • Excessive contract variation • Insolvency/default of sub-contractors or suppliers
	Operation	• Operation cost overrun • Operational revenues below expectation • Low operating productivity • Maintenance costs higher than expected • Maintenance more frequent than expected
Micro level risks	Relationship	• Organisation and co-ordination risk • Inadequate experience in PPP/PFI • Inadequate distribution of responsibilities and risks • Inadequate distribution of authority in partnership • Differences in working method and know-how between partners • Lack of commitment from either partner
	Third party	• Third Party Tort Liability • Staff Crises

Appendix

G

LEP CONTRACT MECHANISMS

1. LEP Contract Performance Mechanisms
2. LEP Key Performance Indicators (KPIs)

APPENDIX G1 – LEP CONTRACT MECHANISMS

1. LEP Business Plan (Shareholders Agreement, Schedule 3)

At the time each LEP was established, the shareholders agreed an initial LEP Business Plan which outlined the specific business of that LEP based on the expected future work and investment opportunities that were expected to flow through the LEP at that time. This is in accordance with Schedule 3 of the Shareholders Agreement (PfS, 2006d). All initial LEP Business Plans are based on a guidance template published by PfS which can be adapted to reflect local requirements. This ensured a degree of standardisation in the objectives and activity of all LEPs while allowing local determination of specific goals. It is a requirement of the LEP Shareholders' Agreement that the LEP Business Plan is updated on an annual basis and so the structure and content of LEP Business Plans have changed to reflect the local needs of each LEP.

As a consequence of the announcement made by the government in July 2010 to cancel BSF, the role of LEPs has changed and the LEP Business Plan for each of the LEPs has been re-considered by their respective shareholders with a view to ensure the continued commercial viability of the LEP and to comply with the statutory duties of LEP directors (BSFI, 2011).

2. Partnering Services Specification (Strategic Partnering Agreement, Schedule 12)

The services to be delivered by the LEP as set out in schedules 11 and 12 of the SPA. The Partnering Services fall into three categories: (i) Delivery Services; (ii) Educational Support Services; and (iii) Additional Services (BSFI, 2011). The main focus of the Partnering Services Specification (PfS, 2008b) is to achieve transformational change in educational achievement which is in line with the aims of BSF. The provision of Partnering Services for New Projects to the LA is one of the main activities of the LEP. The LEP provides the Partnering Services subject to the New Project Approval Procedure (NPAP) and Partnering Services Specification.

The Partnering Services Specification sets out the respective roles and responsibilities of both the LEP and the LA in the partnership. The LEP needs to work closely with the Local Authority and other local stakeholders, particularly end-users such as school governing bodies, head teachers, school staff, pupils, parents and the community.

The schedule encourages the LEP to add value to the programme by complementing and supplementing local expertise and capacity. The LEP is free to subcontract the whole or any part of the Partnering Services to one or more Partnering Services providers. Regardless the resources the PSP and PfS put into the LEP, through this mechanism sufficient Local Authority client side representation must be retained to fulfil a very strong client role. The SPA (Schedule 11) sets out the following Partnering Services Obligations for the LEP:

a) Work with the Local Authority in a supportive manner;
b) Deliver and demonstrate to the SPB the satisfaction of long-term Value for Money targets set out in the SBC, the SPA and the Continuous Improvement Plan;
c) Adopt and demonstrate open book accounting;
d) Report the performance and monitoring of the LEP in the provision of Project Services;
e) Develop and implement the management of the Partnering Services Providers;
f) Produce reports and documentation to the SPB.

The Specification is classified into four columns. The first column sets out a description of each area of activity related to the local BSF programme. The second column sets out the roles and responsibilities of the Local Authority, and what it would commit to do ensuring that the objectives of BSF, set out in the Collective Partnership Targets, are met. The third column then does this for the LEP's roles and responsibilities. The fourth column details the output required for that area of activity to which the LEP and the Local Authority each contribute.

3. Collective Partnership Targets (Strategic Partnering Agreement, cl 6.9 and Schedule 14, part 1)

The LA and the LEP commit themselves to the establishment of a long term capital programme as described in the SBC and the achievement of Collective Partnership Targets (CPTs). The CPTs reflect the objectives of the BSF programme for a local BSF project. They are collective targets in the sense that it is acknowledged and recognised by the LA Client and the LEP that the achievement of these targets requires the initiative, co-operation and effort of all parties. The Local Authority and the LEP 'collectively' commit themselves to the achievement of the Targets. It is important that the CPTs are communicated in a transparent manner to Local Authority stakeholders and LEP staff. The review of the CPTs should bring about an open and constructive dialogue between the authority, local stakeholders and the LEP. The initial Targets are formulated during the development of a LEP in the procurement stage.

- CPTs are formulated during the development of a LEP;
- Take effect after 3 to 4 years of LEP operation;
- Assessed annually at LEP Board and SPB;
- Exclusivity is granted by staying out of any material breach pursuant to CPTs.

If there is any failure of the targets, then the LA and the LEP negotiate in good faith to agree an Action Plan. If any CPTs continue not to be achieved, then the parties negotiate again to rectify the Action Plan. However, if the rectification has not been implemented pursuant to the plan, then the Local Authority is able to treat the LEP failure as a LEP Event of Default where it might lose the exclusivity under an opportunity to remedy.

4. New Project Approval Procedure (Strategic Partnering Agreement, Schedule 3)

Once the LEP is established, it can deliver new and future schools using a two-stage New Project Approval Procedure (NPAP). The Local Authority and the school work with the LEP to deliver the school building project, without having to go through a full competitive procurement process. In outline, the process involves (4ps and PfS, 2008):

- The Local Authority updating and revising its Strategy for Change (SfC). This is the first formal component of the NPAP. It is designed to capture both the Local Authority's strategy for secondary education and requirements that strategy places upon the physical school estate.
- Inviting the LEP to prepare a Stage 1 submission which includes a project, scope, outline proposals and cost estimates. This is used by the Local Authority in the preparation of a further OBC for DCSF approval.
- The LEP prepares a final (Stage 2) submission for approval which includes detailed designs and costings.
- The final submission is used in the preparation of a Final Business Case (FBC), which secures Departmental approval to release funds.
- Starting work on site.

New Projects can be any new PFI Project, D&B Contract, ICT Project or Non-PFI FM Project which is developed by the LEP after Financial Close in accordance with the process outlined in the SPA (BSFI, 2011).

5. Cost Benchmarking Procedure for New Project (Strategic Partnering Agreement, Schedule 21)

Benchmarking is a key mechanism through which the LEP can demonstrate Value for Money to the LA, and satisfy one of the approval criteria for New Projects set out in the SPA.

- Benchmarking is effective at development of any New Projects after the birth of the SPA;
- Assessed by LA Clients;
- It works from a cost-competitive perspective for New Build schemes only;
- Refurbishment and ICT projects are excluded.

It is designed around LEPs not being in a competitive environment, to reassure the LA that they are achieving VfM. The LEP needs to demonstrate Value for Money to the satisfaction of the Strategic Partnering Board by comparing the cost of any New Project to (PfS, 2008c); clause 8.3):

1. The initial projects;
2. The anticipated cost of future projects as set out in the Continuous Improvement Plan;
3. The costs for equivalent projects based on benchmarking data and indices provided by PfS.

PfS had developed a set of pro-forma schemes for LEPs to process all benchmarking data for a BSF project. PfS should supply the information required to conduct benchmarking, but the exercise is carried out by LEPs. The final decision on Value for Money rests with the LA. PfS provided a Target Range for each Benchmark Measure in respect of a particular new project. If the actual summary and elemental measures of that project fall within the PfS Target Range, then the project is judged Value for Money.

Benchmarking works best for New Build or largely New Build projects, and to a considerable extent for refurbishment projects that do not involve large structural alternations. For more

complex refurbishments and for ICT assets and services, some form of Market Testing within the LEP supply chain would provide a more practical route to demonstrating Value for Money.

LEPs carry out a benchmarking analysis by comparing the Benchmark Measures of the new proposal with the PfS Benchmark Target Ranges. For each Benchmark Measure, PfS had set a Target Range, using a mean value, an upper limit and lower limit. The benchmarking analysis needed to be done on a school-by-school basis for whole-life costs, and on a project basis for funding and LEP related costs.

For each Benchmark Measure, the LEP's proposal can either fall within the Target Range or outside of it. Where the proposal falls outside the Target Range, LEPs needed to provide an explanation for why that was the case, and this would be considered by the LA as part of its Value for Money review at Stage 1 and Stage 2 Approval of the NPAP.

6. Market Testing Procedure for New Projects (SPA, Schedule 4)

Market Testing is a retendering procedure during the procurement of New Projects as defined in the Strategic Business Case. Depending on the lifespan of the LEP it is their choice as to which approach to adopt, benchmarking or market testing, in order to demonstrate Best Value for Money in respect of a New Project proposal. The Partnering Services activities of the LEP are not subject to Market Testing. After the 5th year of the SPA the LEP needs to satisfy the requirements of market testing in relation to (PfS, 2008c, SPA, clause 8.2 'Demonstration of Value for Money'):

1) The first representative New Project of each type (PFI, D&B, FM, ICT, etc.);
2) Any other New Project for which Stage 1 Approval is sought prior to the representative New Project having become approved;
3) Any other New Project for which Stage 1 Approval is sought and where the LEP decides to Market Test that project.

In addition, pursuant to clause 8.2c the LEP needs to Market Test any New Project brought forward in the period between the start of the SPA and the 5th anniversary where such New Projects is not of the same type as the initial project(s). In advance of the Market Testing date the LEP needs to discuss and agree:

a) The Market Tested Services which optimises the opportunity for LAs to obtain Best Value for Money;
b) The appropriate media for advertising and identify the prospective tenderers;
c) The basis on which tenderers shall be selected;
d) The tender requirements to determine the preferred bidder.

Market Tested Services means the relevant Project Services and any other service. Following a tendering process the LEP determines which tenderer offers the compliant tender. Unless the LEP can demonstrate to the Local Authority that it will optimise its ability to obtain Best Value for Money, other tenderers may submit any of the Market Tested Services.

PfS has created a framework Tender Evaluation Methodology. The chief executive of the LEP should establish the Market Testing project team and take overall responsibility for the management of the tender evaluation process. The methodology argues that achieving Local Authority requirements, quality standards and service benchmarks is equally as important as achieving the lowest tender price. A balanced assessment of each of the criteria is to be carried out ensuring that the optimal offer is selected.

Value for Money is the essential test against which any market testing exercise is to be justified. It is essential that the evaluation methodology offers a robust, objective, transparent and equitable process against which bid submissions are evaluated.

7. PFI Payment Mechanism & PMS (PFI Project Agreement, Schedule 6)

Market Testing may also happen in a PFI contract within the local BSF programme. This form of market testing is not a part of the SPA. In case the price paid by the authority should change on the basis of a benchmarking exercise and the parties are unable to agree this cost change then a market testing exercise will be undertaken. This involves tendering for the provision of the existing services in the open market after 5 years of operation.

Following a tendering process the PFI SPV determines which tenderer offers the compliant tender. Unless the SPV can demonstrate to the Local Authority that it shall optimise its ability to obtain Best Value for Money, other tenderers may submit any of the Market Tested Services.

8. Non-PFI FM/ICT Payment Mechanism & PMS (Services Agreement, Schedule 5)

ICT Services Contract is a Managed Services contract with two primary components: Installation Services and ICT Operational Services:

- ICT Installation Services encompass the delivery of ICT assets and related installation services (including hardware, software, network components, design services, installation services, testing services and initial training);
- ICT Operational Services include support and maintenance services, security and back-up services, disaster recovery services, continuing training.

The LA's ICT requirements are incorporated into a Schedule and take precedence over the ICT provider's solution (which are also incorporated into a Schedule). The requirements and the solution are negotiated so that these documents are consistent at contract signature. There is no ICT Contract-specific benchmarking or market testing but the provisions of the SPA apply in relation to new / incremental projects (including any proposal to extend the Contract term).

9. PFI Benchmarking and Market Testing (PFI Project Agreement)

Benchmarking may also happen in a PFI contract within the local BSF programme. This form of benchmarking is not a part of the SPA. At specified periods in the Agreement, the Contractor must benchmark some of the "soft" facilities management services provided under the Agreement to ascertain the quality and competitiveness of the services in question. Examples of soft services in schools are: domestic cleaning, catering, security, and caretaking.

This is done by comparing the standards and prices of those services provided with the costs of providing them in similar circumstances by reputable organisations possessing the appropriate skills, resources and financial standing relative to the provision of the benchmarking services in question. The Agreement specifies the circumstances in which the price paid by the Authority should change on the basis of that benchmarking exercise having been undertaken. If the parties are unable to agree this cost change then a market testing exercise will be undertaken. This involves tendering for provision of the existing, specified, services in the open market.

10. LEP/SPV Board report & Management accounts (Management Services Agreement)

The LEP Management Services Company prepare monthly or quarterly reports for submission to the Board of directors of the LEP and its Project Companies. The reports include a project overview, construction update, service reports, hard FM report, lifecycle fund update, soft FM report, financial matters and issues associated with variations, disputes or insurance matters.

The construction report includes:

- Progress against programme,
- Enabling Works,
- Design development,
- Independent Tester's Report,
- Employers Agent Report,
- Variations,
- Safety,
- Quality,
- Environmental issues,
- Decanting and commissioning.

The FM reports include:

- Performance against output specifications,
- Quality Audit Reports,
- Maintenance – Planned / Reactive,
- Service quality and Performance,
- Performance against output specification,
- Energy Management,
- Risk Management.

The management accounts include:

- Invoicing and payment report,
- Reports on a monthly basis during Construction and quarterly during Operations showing actual cash, Profit & Loss account and Balance Sheet performance against forecast and base case model,
- Quarterly to complete forecast,
- Services Performance - reconciliation against performance monitoring,
- Variations Proposed,
- Compliance with Funding Documents (e.g. operating model updates).

11. Key Performance Indicators (Strategic Partnering Agreement, Schedule 14, part 2)

The Key Performance Indicators (KPIs) govern the Track Record test set out in the SPA, cl.6.6 and Schedule 14, part 2. The exclusivity granted to the LEP is contingent upon the LEP being able to meet all the KPIs. The mechanism is classified into 6 categories which constitute the area of assessment. Each area has its objectives and a number of KPIs in order to fulfil the aims of BSF. The schedule clarifies for each KPI how it should be measured and over which period. Some KPIs are referred to specific guidance on particular targets.

The Local Authority determines the target setting of the KPIs. Indicators can be set higher or lower where both parties (LEP and LA) believe that the partnership would benefit from a change to the KPIs. The performance mechanism also identifies whether or not KPIs have a National Priority. However, for National Priority KPIs, a change also requires PfS approval. Finally, the mechanism defines which KPI should be added to the Continuous Improvement plan and on what manner.

For each KPI there are Track Record Targets set out for New Build, Refurbishment and for FM and ICT Services. There are Level 1 targets and Level 2 targets. Failure on any one of the Track Record Target Level 1 KPIs means the Local Authority may remove the LEP's exclusive right to provide Partnering Services and project services for the next project due to be brought forward to the LEP. Failure on any one of the Track Record Target Level 2 KPIs counts as a 'Significant Performance Failure' and may possibly lead to termination of the SPA or removal of the LEP's exclusivity.

This instrument comes into effect once a LEP is established and involves all activities of the LEP. KPIs apply during the work under New Project Development to the stages of design, construction, maintenance and operation. The LEP has to monitor the KPIs and communicate the results in a transparent manner. The KPIs are reviewed annually by the LEP Board and Strategic Partnering Board.

12. Continuous Improvement Targets (Strategic Partnering Agreement, Schedule 15)

Another key requirement for the LEP is to demonstrate long-term Value for Money to the LA by putting forward proposals in relation to continuous improvement of the initial capital project (PfS, 2008c, SPA clause 8.2a), and any future new project (PfS, 2008c, SPA Schedule 3, clause 4.3i & 4.4b).

This has to be achieved and developed against the Continuous Improvement Plan for each phase of BSF investment in order to reflecting best practice, knowledge and experience gained over time and across the projects (PfS, 2008c, Schedule 15). The Continuous Improvement Plan has to be developed by private sector bidders as part of the original procurement of a LEP. Once developed it is revised from time to time during the LEP's lifespan. The LEP periodically reviews this plan with other members of the SPB. Amendments and improvements need to be made to reflect current circumstances. Targets are set for each element of the

Continuous Improvement Plan, and changes to these targets require the joint approval of the LEP and the Local Authority.

- Effective from procurement stage up to operation.
- Subject to annual review by LEP Board and SPB.
- Exclusivity is granted when all Targets are met.

The plan contains strategies and targets for improvements in the following areas:

- General; reduction construction waste, no disruption to teaching, improvements in design quality, reductions in average construction costs, maximising economies of scale and scope.
- PFI contracts; faster timescales, improved performance in the PFI schemes, maximising efficiencies.
- Design and Build contracts; faster timescales, greater cost certainty, maximising efficiencies.
- Maintenance Services contracts; improved performance of KPI targets, maximising efficiencies.
- ICT contracts; faster timescales, greater cost certainty, improved performance in the ICT contracts, improvements in design quality, improvements in BREEAM ratings and Asset Management Plan scores, improvements in energy efficiency.

For the Local Authority the LEP has to explain and demonstrate clearly the identified targets set for each element of the Continuous Improvement Plan. Each LEP has to set out its detailed methodology for ensuring that these targets are achievable. The LEP also needs to explain how they motivate its supply chain to meet the targets.

APPENDIX G2 – LEP KEY PERFORMANCE INDICATORS

(SPA SCHEDULE 14, PART 2)

Appendix

H

PHILOSOPHICAL POSITIONING

APPENDIX H – PHILOSOPHICAL POSITIONING

A fundamental step in establishing the most appropriate research design is to understand what philosophical assumptions the study is rooted upon and what motivates the authors. The research design development starts with philosophical assumptions that have practical implications for designing and conducting research (Denzin and Lincoln, 2011).

Epistemological Position

Epistemological assumptions in academic research relate to the questions of 'what constitutes acceptable knowledge' and 'how we know what we know' especially in terms of the relationship between the researcher and the researched (Knight and Turnbull, 2009). Smyth and Morris (2007) argued that blurring out epistemological issues in research can potentially weaken the knowledge base for research and practice. Two more dominant and divergent epistemological positions are positivism and interpretivism (Ponterotto, 2005). While positivist epistemology believes that the methods of the natural sciences should be applied to the study of social phenomena (Becker and Niehaves, 2007; Denzin and Lincoln, 2011; Turner, 1985), interpretivist epistemology sees a phenomenon as having different subjective meanings for the actors studied (Denzin and Lincoln, 2011; Weber, 2004). Positivist epistemology is often associated with quantitative research approaches, while interpretive epistemology is predominantly qualitative. Sole quantitative research is based on the assumption that all social phenomena can be described or measured with a numerical system (Robson, 2002). It is often characterised by the development of hypotheses, drawn from literature review, that are subsequently tested. The data used to test these hypotheses is often collected using questionnaires or interviews. Quantitative research is seen to offer statistical advantages, as it allows large amounts of data to be collected and analysed in a logical and replicable way (Robson, 2002). In contrast, interpretivist epistemology is founded on the belief that reality is subjectively constructed, for which the researcher has to constantly interact with the object of investigation as an 'insider' to uncover deeper meanings through interactive dialogue and interpretation (Creswell, 2014; Ponterotto, 2005). Thus, the more the researcher engages with research participants in their natural settings, the more they (the researcher) get to 'know what they know' about what is being researched. It is often seen in qualitative research, used in the exploration of a subject area in which only a limited amount of knowledge exists. The objective of qualitative research is to collect and analyse information from which new knowledge can be inducted. The objects of this type of research are usually people and their perceptions. Qualitative research is sometimes referred to as 'hypothesis generating research' (Bryman, 1984; Denzin and Lincoln, 2011).

The exploratory nature of this research come with both qualitative as well as quantitative strands. The primary unit of analysis is at organisational level (contract participants in the LEP) which is predominantly qualitative data and the secondary unit of analysis is at asset level (the individual schools delivered by LEPs) which involves more quantitative data, but also includes

some qualitative data. This combination suggests a pragmatism approach to methods. Both types of analyses are based on ex-post data (based on actual results rather than forecasts) that comprise both a quantitative appraisal component (chapter 8) and qualitative evaluation component (chapter 9). Finally, existing management theory is elaborated upon rather than newly construed, which suggest that the logic of the main argument is neither deductive nor inductive. It is rather a mixture of both since the theoretic learning framework developed in chapter 6 is operationalised and subsequently validated by a panel of experts in chapter 9.

Ontological Position

The investigation of ontological distinctions is a key aspect of the research process as it allows the researcher to explicitly reveal how their perceptions of human nature impact on the approach they consciously adopt to uncover social truths (Denzin and Lincoln, 2011). There are two divergent perspectives on the nature of reality: objectivism and subjectivism. In realist ontology (objectivism) reality is given independent of the observer (Burrell and Morgan, 1979; Denzin and Lincoln, 2011) while constructivist ontology (subjectivism) is built on the belief that there is no observed phenomenon without an observer (Denzin and Lincoln, 2011; Ruggie, 1998). This research study adopts the constructivist approach in that it views reality as the result of human perception which forms the social phenomena under investigation. Taking a constructivist approach, the creation of new knowledge from empirical analysis is seen as a social construction built up from the actions and perspectives of social actors (Bryman and Bell, 2015). The new knowledge generated is a synthesis of critical analyses of the existing body of science, organisation and asset level data available and through the development and implementation of a conceptual learning framework. Making decisions on a project's efficiency, effectiveness and sustainability is a social process and highly contextual, hence strongly affected by the perceptions of project actors and unique project characteristics (Cooke et al., 2007). Therefore, this research holds the view that the development and implementation of a conceptual learning framework using the perspectives from various social actors cannot be seen objectively; rather they are created, invented, and constituted in their social context during the process of design, development, and use. However, if the investigator has control over events involved then quantitative data are preferred (e.g. research objective 1 defined in section 1.3 is about the ability of LEPs to deliver whole-life Value for Money and environmentally sustainable assets). The LEP level analyses needed to fulfil research objective 2 involve data that are concerned with, or verifiable by observation or expert opinion rather than theory or pure logic. The findings are therefore empirical rather than normative, whereby objective and subjective viewpoints are sought and related to one another. This again, implies that the paradigm of pragmatism fits best with the research study.

Axiological Position

The axiological position is concerned with the role of the researcher's values, intuitions and biases in the research process (Denzin and Lincoln, 2011; Ponterotto, 2005). When the researcher takes an objective position, the research process is arguably less value laden as

the researcher's values become less important. If a subjective position is taken, such values and lived experiences cannot be divorced from the research process. It is therefore important for the researcher to duly acknowledge biases that are introduced through their personal values, beliefs and prior knowledge in interpretivist research (Denzin and Lincoln, 2011; Ponterotto, 2005). While there is no agreement on the importance of formally acknowledging the extent to which the researcher's own values influences the research process – reflexivity – it still remains a necessary process in qualitative research (Corbin and Strauss, 2014).

The researcher had a sufficient level of expertise about and professional engagement in the legacy BSF policy prior to the start of the research study in 2010. Until completion of the research in 2017, the researcher continued to be professionally engaged as the appointed General Manager on one of the operational LEPs established as part of the legacy BSF programme. This BSF project and its LEP in Luton were not selected as a part of the interview survey (section 6.6 refers), however the 10 assets created by that particular LEP are within the sample set of 600 LEP-built schools under investigation for this research. Thus, it can be argued that objectivity of the researcher might be impaired or biased due to the influence of the researcher on actual policy delivery. The researcher has attempted to separate his work activities from the research environment, however he is aware of his engagement and acknowledges this need to be clarified. For that reason, section 11.9 is devoted to reflexivity, and clarity is given about the researcher's personal values, ethics, confidentiality, politics and bias. The diverse viewpoints to be accommodated along with the need to explain the researcher's personal value systems calls for a paradigm of pragmatism as a best fit for the research study.

Appendix

I

DETAILED RESEARCH STRATEGY FLOWCHART

Appendix J

DATA SOURCES

1. LEP Level Metadata
2. School Level Metadata
3. Definitions for School Level Variables

Appendix

K

LEP INTERVIEW SURVEY

1. Notes of meeting with EFA & UCL on 20-11-2012
2. Interview Survey Protocol
3. Interview Survey Questionnaire
4. Non-Disclosure Agreements

APPENDIX K3 – INTERVIEW SURVEY QUESTIONNAIRE

APPENDIX K4 – NON-DISCLOSURE AGREEMENTS

The following Non-Disclosure Agreements were signed in relation to this research:

	Organisation	**Data**	**Signed**
1	Department for Education	Consistent Financial Reporting data	Yes
2	Education Funding Agency*	Schools capital cost data	Yes
3	Partnerships for Schools*	School Building Surveys 2007/09/11	Yes
4	Construction Industry Council	Design Quality Indicators data	Yes
5	Barnsley LEP	Interview data, school level data	Yes
6	Essex LEP	Interview data, school level data	Yes
7	Leicester LEP	Interview data, school level data	Yes
8	Lewisham LEP*	Interview data, school level data	Yes
9	Newcastle LEP	Interview data, school level data	Yes
10	Southwark LEP	Interview data, school level data	Yes

Those organisations marked with (*) have requested that the researcher signs their template. All the other organisations have accepted the UCL template; a copy is displayed below.

Confidentiality Agreement

Application for [name LEP] data

Confidentiality Agreement for access to [name LEP] data

Please complete sections 1 – 4 below, sign the declaration and return the form to:

[Name & Address details…….]

1. The information you require (please specify)
Responses from various disciplines involved in the LEP to questions from a structured questionnaire. If possible, the following LEP and school level performance data: 1. List of schools, opening dates, capex/opex figures, procurement routes, key stakeholders 2. LEP Business Plan 3. LEP Performance Report

2. The use you intend to make of the information (i.e. details of the educational purposes of the planned research)
For the purpose of PhD research into the effects of strategic partnership procurement on the long-term operational and sustainability performance of social infrastructure. The project delves into the BSF 'Local Education Partnership' model for modernising large-scale school infrastructure in England.

3. Whether schools' identities are required, and if so, for what purpose
Yes, this would be useful as I am collecting data at LEP-level and school-by-school level for BSF projects. Individual schools & LEP data will be anonymised in the final & draft thesis and in the data final capture.

4. The particular arrangements you will make to keep the data secure
As per requirements of [name LEP] and similar arrangements made with other PhD research students. I am willing to keep the data password-protected and stored on a stand-alone laptop or desktop pc.

DECLARATION:

I, the undersigned, agree that:

a. No LEP and school will be identified publicly, unless the LEP or schools concerned have themselves given to me their agreement in writing to do so;
b. no data will be passed on to a third party;
c. no research findings and/or data will be published that could compromise a LEP, school or a local authority's identity and without the prior written consent.

Signature: (Person responsible for project)

Name:
Daan Vermeer

Title:
PhD Research Student

Organisation:
University College London, School of Construction and Project Management

Head of organisation:
Prof Andrew Edkins

Address:
UCL The Bartlett, Faculty of the Built Environment
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Fax:

Any queries about this form should be made to:

<Name>
<Address details>
<Telephone>
<E-mail>

Appendix

L

QUALITY FUNCTION DEPLOYMENT

1. Asset Value QFD input assumptions
2. Asset Value QFD metadata (WHATs & HOWs)
3. Input tables for ‘WHATs’
4. Input tables for ‘HOWs’
5. Asset Value QFD software instructions

APPENDIX L1 – ASSET VALUE QFD INPUT ASSUMPTIONS

Further to the methodological approach to QFD and the logic of the Asset Value QFD matrix in section 6.8.6, an overview of all QFD input assumptions is shown at this **Appendix L1**. Using these assumptions and the metadata at **Appendix L2**, the QFD process for producing each of the four populated matrices (following the AVEM's Plan-Do-Check-Act stages) in **Appendix Q** is set out below.

1. A proxy measure for the level of relative complexity judged by LEP participants about the conditions within each contract performance mechanism (ROOM 1);

- Complexity is measured by counting the frequency of respondents that indicated particular conditions as challenging for their discipline in response to a survey question.
- Data input tables in **Appendix L3** display examples of relative complexity of performance conditions, at an ordinal scale from 'very low' to 'very high'.
- If for a discipline a performance condition is judged as complex or challenging in more than one LEP, it will have a higher priority, as shown below on the left:

Frequency	Complexity Rating of 4 selected LEPs
0	Very Low
1-2	Low
3	Medium
4-5	High
6	Very High

Frequency	Complexity Ratings of remaining 8 benchmark LEPs
0	Very Low
1-4	Low
5-6	Medium
7-10	High
11-12	Very High

- Judgments on the most complex performance conditions by the remaining eight benchmark LEPs, as shown above on the right.

2. The extent to which observations about the most challenging conditions are shared by other LEP participants (ROOM 1);

- Complexity frequencies are displayed with a column for each of the six LEP participants.
- It needs to be pronounced what reflects a shared opinion across the four selected LEPs, hence the following assumptions apply:

Complexity:

- Ratings of the selected LEPs are equally distributed between their lowest and highest measured frequencies from 1 to 6; for the remaining benchmark LEPs it is from 1 to 12.
- Ratings are set "Very High" for any counts >6; for the remaining benchmark LEPs it is >12.
- Any condition marked complex ≥3x by a single LEP participant (e.g. Equity Investor) is deemed a "High" rating. These are shown with red shades cells in the complexity tables at **Appendix L3**.
- Frequencies in the table are uplifted to include for those respondents that have selected a sub-heading (e.g. LEP Business Plan - 1.00 Objectives & Associated Milestones) instead of a specific performance condition (e.g. LEP Business Plan - 1.03 LEP Structure).

Involvement:

- SINGLE DISCIPLINE: responses of three or four LEP respondents in one discipline (e.g. Local Authority) are similar.
- IMPORTANCE: ≥50% of LEP participants are involved in a contract condition, while controlling for those in benchmark LEPs with "High" or "Very High" complexity ratings.

3. The shared observations for each of the six entities about the nine value measures (ROOM 2);

- Data input tables (example in **Appendix L4**) display responses from the four selected LEPs to nine questions in the questionnaire at **Appendix K3** about each contract mechanism.
- Each of the six LEP participants is distinguished with a separate frequency column. The frequencies show how many LEP participants have a shared opinion about a particular answering category (e.g. "It is very to extremely important to have [a LEP Business Plan]".
- Answering categories have been set to a 3-point scale, sometimes by combining answering categories (e.g. 'Good' and 'Excellent' becomes 'Good to Excellent'). As a result, the input data have only two or three answering categories, plus one for 'Don't know'. There is one exception with ten nominal categories to be able to determine the stages of involvement.
- Shared opinions across the four selected LEPs need to be pronounced with a relative response rate, therefore these assumptions apply:

ALL PARTICIPANTS RULE: Strong when ≥66.6% of answers from all participants who responded are similar, medium when ≥33%<66.6%, weak when >0%<33.3%, none when 0%.
---AND---
RESPONSE RATE RULE: ≥12 respondents (minimum 50%) have answered the question.
---OR---
SINGLE DISCIPLINE RULE: responses of all four respondents in at least one discipline are similar.

4. The extent to which the opinions about the nine value measures are collectively shared by other disciplines in the LEP (ROOM 3);

The relationship matrix translates demanded values of each participant into value measures. Purpose of the matrix is to categorise the strength of relationships between value measures and contract performance conditions. That means, the extent to which client's expectations are collectively shared by LEP participants, in relation to performance conditions and value measures. There are four categories to point out the strength of the relationships:

9 = Strong means that ≥66.6% of LEP participants share the same opinion about a vale measure and complexity rate of a performance condition is 'High' or 'Very High'.
3 = Medium means that ≥33.3% and <66.6% of LEP participants share the same opinion about a vale measure and/or complexity rate of a performance condition is 'Medium'.
1 = Weak means that ≥1% and <33.3% of LEP participants share the same opinion about a vale measure and/or complexity rate of a performance condition is 'Low'.
0 = None means that 0% of the LEP participants share the same opinion about a vale measure and/or complexity rate of a performance condition is 'Very Low'.

There are some further nuances to what determines the relationship strength (e.g. a minimum response rate of 50% and the number of times an observation is shared by a single participant on all four LEPs.

It is important to note that the decision about a relationship strength is purely based upon the shared observations across disciplines in the LEP. There has been no other judgment base. By looking at the relationships only in terms of common observations being collectively shared, it will be possible to make statements about the learning impact of certain value measures on certain performance conditions and vice versa.

5. A level of priority based on the shared judgements of disciplines across LEPs to meet the most critical performance conditions (ROOM 4);

The purpose of this part is to establish priorities of those value measures that have the greatest positive impact on the contract mechanism as a whole, because it contains the most shared observations across LEP participants.

Within each contract mechanism multiple performance conditions can be identified as highly complex across disciplines. Hence there may be more shared observations in relation to a value measure. The cumulative strength of relationships within a column can be calculated. A value is given to each category of relationship: Strong = 9, Medium = 3, Weak = 1, or None = 0. The cumulative complexity score of a certain value measure can be calculated as follows:

$$Complexity\ Assessment\ High\ Score = \sum (Crel * Srel)$$

Crel = relative complexity of a performance condition
Srel = relative strength of relationship (9, 3, 1, 0)

Value measures with the highest complexity scores will form the top of a priority 'wish list' of key collective observations from LEP participants in order to meet the client's expectations. Lower complexity scores will follow and the bottom of the list will have any observations and learning points from individuals without direct relationships because those LEP participants have articulated different or conflicting observations about the value measures and/or complexity of performance conditions within contract mechanisms.

6. Gap analysis and important controls leading to collective observations (ROOM 5&6);

The purpose of this part of the Asset Value QFD (rooms 6A, 6B, 6C) is to compare collective observations about the value measures of LEP parties from:

- A category of four selected LEPs against the remaining cohort of eight benchmark LEPs.
- Two opposite performing selections of LEPs within the same area of analysis (Table 9-9), to see what differences become apparent. For example, LEPs with predominantly better versus worse environmentally sustainable schools. The controls are separated into four groups: QFD1 vs QFD2; QFD3 vs QFD4; QFD5 vs QFD6; and QFD7 vs QFD8.

  The collective observations can be displayed as:

  "0" meaning in line with the remaining cohort (or opposite category);
  "1" meaning higher than the remaining cohort (or opposite category);
  "-1" meaning lower than the remaining cohort (or opposite category).

It may occur that for certain participants there are no common observations due to a lack of shared opinions or absence of any opinions. In that case, no further judgments are possible, and the cell on the Asset Value QFD is left blank.

APPENDIX L2 – ASSET VALUE QFD METADATA

(WHATs & HOWs)

APPENDIX L3 – INPUT TABLES FOR ‘WHATs’

PERFORMANCE CONDITION COMPLEXITY RATINGS

(EXAMPLE QFD 1)

APPENDIX L4 – INPUT TABLES FOR ‘HOWs’

RELATIVE RESPONSE RATE OF NINE VALUE MEASURES (EXAMPLE QFD 1)

APPENDIX L5 – ASSET VALUE QFD SOFTWARE INSTRUCTIONS (STEP-BY-STEP GUIDE)

Appendix

M

RELATIONSHIPS AND SENSITIVIES

1. Basic relationships between Asset Value Criteria
2. PfS influencing factor analysis on school building costs
3. Additional sensitivity analyses

APPENDIX M2 – PfS INFLUENCING FACTOR ANALYSIS ON SCHOOL BUILDING COSTS

APPENDIX M3 – ADDITIONAL SENSITIVITY ANALYSES

In addition to those sensitivity analyses displayed in Table 8-10 of the thesis, further sensitivities have been analysed for capital costs and construction time:

Capital Costs (£/m2)

Assume a typical 10,000 – 12,000m^2 secondary school (outside London), and a typical 4,000 – 6,000m^2 primary school (outside London).

Sample size: 600 LEP-built schools	**All schools (£/m^2)**	**Primary New Build (£/m^2)**	**Primary Refurbished (£/m^2)**	**Secondary New Build (£/m^2)**	**Secondary Refurbished (£/m^2)**
# schools in sample	600	95	80	237	139
Average	1,973	2,488	1,424	2,241	1,478
Median	2,024	2,383	1,231	2,233	1,422
		584	786	422	706
Decile 1	984	1,830	573	1,763	688
Decile 2	1,351	1,988	794	1,870	914
Decile 3	1,652	2,167	985	2,005	1,098
Decile 4	1,840	2,241	1,110	2,115	1,277
Decile 5	2,024	2,383	1,231	2,233	1,422
Decile 6	2,204	2,459	1,394	2,297	1,513
Decile 7	2,311	2,682	1,657	2,401	1,654
Decile 8	2,502	2,874	1,925	2,549	1,907
Decile 9	2,801	3,350	2,641	2,721	2,374
Decile 10	4,600	4,282	4,000	3,929	4,600
Average Decile 2 to 9	**2,116**	**2,578**	**1,533**	**2,310**	**1,586**
Contracted thresholds	**n/a**	**2,695**	**932**	**2,079**	**1,100**
% Sensitivity	**n/a**	**4.5%**	**-60.8%**	**-87.7%**	**-69.4%**

From the analyses in the table above, and based on a typical size primary and secondary school, it can be observed that contracted EFA/BCIS thresholds for New Build Primary schools are reasonably achievable. However, this is not the case for New Build secondary schools and any refurbishments. Actions taken to address these high sensitivities are covered in section 6.5.3 of the thesis: Gross Internal Floor Area data (m^2) that measure the size of schools has been split into 11 groups between 0 and 2,000m^2 and +20,000m^2. Furthermore, the cost data has been controlled for a location factor for London, as well as a price indexation factor depending on when a school was built.

Construction Time (months)

Sample size: 600 LEP-built schools	**All schools (months)**	**Primary New Build (months)**	**Primary Refurbished (months)**	**Secondary New Build (months)**	**Secondary Refurbished (months)**
# schools in sample	600	86	84	234	136
Average	20	18	13	23	22
Median	19	17	12	21	22
Decile 1	11	12	9	17	14
Decile 2	15	14	9	18	16
Decile 3	17	14	10	19	18
Decile 4	18	15	10	20	20
Decile 5	19	17	12	21	22
Decile 6	21	18	13	22	24
Decile 7	23	19	15	24	25
Decile 8	25	22	17	26	26
Decile 9	28	24	21	30	29
Decile 10	46	34	31	46	46
Average Decile 2 to 9	**21**	**18**	**14**	**23**	**22**
Contracted thresholds	**n/a**	**18**	**24**	**24**	**32**
% Sensitivity	**n/a**	**0%**	**71.4%**	**4.3%**	**45.5%**

From the table above it can be observed that contracted time KPIs for any New Build schools are fairly realistic. However, the thresholds for refurbishments appear to be set too lenient. The Standard KPI may have been set this way to allow for delays for decanting and partial closures of areas, or a phased programme of works.

Appendix

N

LEP SCHOOL PIVOT TABLE

(IN SUPPORT OF TABLE 9-8)

Appendix

O

QFD ASSESSMENT FORM

(EXAMPLE QFD1)

Appendix

P

EXAMPLE COMPLEXITY ASSESSMENT REPORT

(ALL QFD REPORTS IN CD APPENDIX)

Appendix

Q

ASSET VALUE QFD MATRICES

(QFD1 TO QFD8)

Appendix

R

COLLECTIVE LEARNING CURVES FROM ASSET VALUE QFD

Appendix S

OPPORTUNITIES TO LEARN & COLLECTIVE LEARNING POINTS

APPENDIX S – OPPORTUNITIES TO LEARN & COLLECTIVES LEARNING POINTS

PLAN --- Strategic Framework & Targets

	Learning from organisations participating in strategic procurement systems			
	(1) Opportunities to learn in <u>better</u> performing LEPs	**(1) Opportunities to learn in <u>worse</u> performing LEPs**	**(2) Collective learning points of key participants in <u>better</u> performing LEPs**	**(2) Collective learning points of key participants in <u>worse</u> performing LEPs**
--- PLAN --- Strategic Framework & Targets	**1) LEP BUSINESS PLAN** The Shareholders Agreement requires LEPs to agree an annual Business Plan by its Board of Directors to take forward the requirements identified in the SBC/SfC for an exclusory period of 10-15 years. The plan also covers income, costs and capital requirements for the LEP as well as corporate business objectives and targets. A full description is in **Appendix G1** and a breakdown is in **Appendix K3**.			
	1.03 LEP Structure Structure has had to deal with a lot of change, even radical when BSF was cancelled. It is about trying to predict the future and then trying to match running cost of the LEP with the turnover. (3) **3.04 Interface LEP and LA** More Senior Governance needed to motivate strategic discussion. In being transparent and open means interests can clash. There is trust to let the LEP get on with it, no 'man-marking' culture. SPB was ineffective, a management forum was created instead. (1,7) **7.00 Supply chain management** LEP directors often wear more hats (as Investor and contractor) resulting in conflicts of interest despite governance structures in place. One LA warned that integrated supply chains can be jeopardised if contractors take a traditional adversarial approach, instead of a partnership. GMs have to ensure the supply chain performs to keep credibility and reputation.(5)	**2.01 Recruitment Strategy** Due to reducing and fluctuating workloads investors and GMs had to tightly manage staff recruitment. It's about trying to predict the future, linked to budget constraints and match LEP costs with turnover. (8) **2.02 Employment Strategy** Appetite for expert LEP resource depends on the ability to deliver ongoing projects, resolve issues outstanding, and if therefore LAs allocates a future pipeline. Some LEPs moved away from original BSF visions into a resource and finance driven Business Plan. (8) **3.04 Interface LEP and LA** Mistrust caused by LAs who never wanted a big LEP interface, or BSF perceived as a failing program. LAs who hire advisors to manage capital delivery and operational PFIs, result in a culture of 'man-marking' LEPs and their supply chains. Stroppy interfaces appear causing many blockers, senior level personality conflicts, and a penalising culture, not promoting improvement. Client relationships deteriorate even more by poor completion handovers leaving a difficult situation for FMs. Some LEPs changed this picture, others lost confidence or continuity with LAs. High turnover of directors or LA/contractor conflict of interest can create distrust due to changing agendas or views at the Board.(6,8) **7.00 Supply chain management** GMs had to ensure supply chain performance to sustain credibility and reputation of the LEP (2,4)	<u>Lower Capex LEPs</u>: • Involved at NPD and M&O stage by LA, EI, GM; • No collective observations; • Some elements were added or modified (EIs); • Adhere to methods & policies (EI & GMs). <u>More cost effective LEPs</u>: • No collective observations. <u>Better env. sustainable LEPs</u>: • No collective observations. <u>Cohesive LEPs</u>: • No collective observations.	<u>Higher Capex LEPs</u>: • Involved during NPD stage by EI, GM only; • Fair communication LEP & Supply chain (EIs); • Some elements were added or modified (GMs, none for EIs); • No collective observations. <u>Less cost effective LEPs</u>: • Some elements were added or modified (LAs). <u>Worse env. sustainable LEPs</u>: • No collective observations. <u>Adversarial LEPs</u>: • No collective observations.
	2) COLLECTIVE PARTNERSHIP TARGETS To demonstrate the LEP's performance in the context of targets and objectives in the SBC/SfC as well as to reflect performance in relation to the overall BSF objectives. CPTs are collective targets in the sense that it is acknowledged and recognised by the LA and LEP that the achievement of these targets requires the initiative, co-operation and effort of all parties. A full description is in **Appendix G1** and a breakdown is in **Appendix K3**.			
	CPTs have initial BSF aspirations that are unachievable and linked to later wave projects, which are often cancelled making it hard to deliver. Continued high staff turnover puts challenges on LEPs to contribute to CPTs and due to severe austerity measures the contribution required from LAs is minimal. (1,3,7)	Due to continued high staff turnover (churn) it is challenging to contribute to these targets. Working with LAs on CPTs was also difficult due to the severe austerity measures their required contribution was very minimal. (6,8)	<u>Lower Capex LEPs</u>: • Involved at NPD, Construction and M&O stage by EIs, GMs. <u>More cost effective LEPs</u>: • No collective observations. <u>Better env. sustainable LEPs</u>: • Accuracy is poor-very poor (EIs). <u>Cohesive LEPs</u>: • Only somewhat important (EIs).	<u>Higher Capex LEPs</u>: • No collective observations. <u>Less cost effective LEPs</u>: • No collective observations. <u>Worse env. sustainable LEPs</u>: • Only somewhat important (EIs). <u>Adversarial LEPs</u>: • Accuracy is poor-very poor (EIs).

	Learning from organisations participating in strategic procurement systems			
	(1) Opportunities to learn in <u>better</u> performing LEPs	**(1) Opportunities to learn in <u>worse</u> performing LEPs**	**(2) Collective learning points of key participants in <u>better</u> performing LEPs**	**(2) Collective learning points of key participants in <u>worse</u> performing LEPs**
	1.02 Teaching and learning Quantitative CPTs monitored by LEPs like 'Teaching and Learning' are less relevant to them but more for LAs, e.g. number of insurance claims following pupil vandalism, or number school incidents reported. Some LEPs have established other CPTs on programmes for students (e.g. traineeships, apprenticeships) and for extended schools. (7) **1.03 SEN and Inclusion** The concept is good in that the LEP is monitored but nobody monitors the LA contribution, hence this CPT does not work well unfortunately. LAs struggle to get hold of the data and have to build the dataset to be able to monitor it with the LEP. (7)			

Table 1: Findings from LEPs about 'Strategic Framework & Targets'

DO --- Implementation & Management Processes

	Learning from organisations participating in strategic procurement systems			
	(1) Opportunities to learn in <u>better</u> performing LEPs	**(1) Opportunities to learn in <u>worse</u> performing LEPs**	**(2) Collective learning points of key participants in <u>better</u> performing LEPs**	**(2) Collective learning points of key participants in <u>worse</u> performing LEPs**
--- DO --- Implementation & Management Processes	**3) NEW PROJECTS APPROVAL PROCEDURE** The purpose of the NPAP is to set out a two-stage approval procedure for all New Projects and how the LEP and the LA will work together to agree which New Projects will be taken forward and approved for development by the LEP. A full description is in **Appendix G1** and a breakdown is in **Appendix K3**.			
	1.01 Stage 1: Preparation of New Project Proposal & OBC For LAs to use the NPAP in the first place is challenging. Besides investors also raise: (1) schools funding allocation is insufficient to meet all the ARs; (2) Client led 'requirements creep' between Stages 1 and 2 puts pressure on all parties; and (3) getting LAs to sign-off New Project Proposals and VfM assessments. GMs and investors say that NPAP is can be adjusted to suit new economic cycle or political landscape. (1,5) **1.07 OBC Endorsement by PfS** PfS (now EFA) Stage 1 approval timescales and submission of the OBC (sometimes called Strategic Delivery Plan) take longer at this NPAP stage. It is hard to predict when EFA will approve. Many iterations and negotiations create pressure and a potential risk and blocker into the LEP's pipeline. This OBC stage works for BSF schemes only, but has to change into an Options Appraisal and a Feasibility Stage for any New Projects post-BSF cancellation. (7) **2.02 New Project Final Approval Submission** If a Submission is not progressed then the scheme will be at risk for contractors. A long deliverables list is required, whereas less gateways / submission criteria make the process go quicker. (7) **2.09 Financial Close** Some LEPs had challenges to hit budgets or balance affordability with stakeholder aspirations. In order to reach FC a delegated responsibility of approvals is introduced. (7)	**1.01 Stage 1: Preparation of New Project Proposal & OBC** Especially investors find this part challenging: (1) schools funding allocation is insufficient to meet all the ARs; (2) Client led 'requirements creep' between Stages 1 and 2 puts pressure on all parties; and (3) getting LAs to sign-off New Project Proposals and VfM assessment. (8) **1.02 Stage 1 Submission: New Project Proposal** Contractors struggled to achieve budgets so they had to remove / reduce certain risks and liability caps in the Building Contract. Tough discussions on setting LA expectations what LEPs could deliver within budget constraints pre and post BSF cancellation. (2) **1.08 Stage 1 Approved Project** Failure to meet affordability target envelope caused LAs to go through lots of loops. Also survey risk, and administration of some of the contract terms (e.g. latent defects, title risks) created lots of debate. One LA resolved it by working closely as a co-located team with the LEP. (2) **2.02 New Project Final Approval Submission** From a contracting point of view, if this stage is not progressed then the scheme will be at risk. This OBC stage works for BSF schemes only, but has to change into an Options Appraisal and a Feasibility Stage for any New Projects post-BSF cancellation(4) **2.03 Stage 2 Approval** LAs use their influence before a Project is approved by focusing on VfM, coordinating documents, checking if these reflect the ARs. Contractors were interrogated by LAs questioning / challenging but without direction, often described as an "inner-city approach". (6,8) **2.09 Financial Close** Achieving EFA/LA approvals and timescales for FBC submission can be hard as well as controlling when EFA will approve schemes. When nearing FC all issues come to surface. Many iterations and negotiations can create pressure, risks or a blocker into the LEP's pipeline. To alleviate this risk LAs can put in delegated responsibility of approvals. (4)	<u>Lower Capex LEPs</u>: • Involved at NPD and M&O stage by EI and GM only; • Very-extremely important; • No collective observations; • No collective observations; • No collective observations; • No collective observations; • Some elements were added or modified (EIs and GMs); • No collective observations. <u>More cost effective LEPs</u>: • Involved at NPD by EI and DB. GM from pre-OJEU to M&O. • Very-extremely important; • No collective observations; • Good-Excellent communication LEP & LA Client; • Good-excellent sharing of data; • Some elements were added or modified (LAs); • Adhere to methods & policies. <u>Better env. sustainable LEPs</u>: • Involved at NPD by EI, GM, DB • Very-extremely important; • Accuracy is good-excellent; • No collective observations; • Some elements were added or modified (GMs, DBs); • No collective observations. <u>Cohesive LEPs</u>: • Involved at NPD by GM, DB only. GM from OJEU to M&O. • Very-extremely important to all (except TA); • No collective observations; • Good-Excellent communication LEP & LA Client; • Good-Excellent communication LEP & Supply chain; • No collective observations; • Good-excellent achievable; • Some elements were added or modified (EIs, GMs, DBs); • No collective observations.	<u>Higher Capex LEPs</u>: • Involved at NPD by EI, GM, DB (and at M&O by EI, GM); • Very-extremely important; • Accuracy is good-excellent; • Good-Excellent communication LEP & LA Client; • Good-excellent sharing of data; • Good-excellent achievable; • Some elements were added or modified (LA Clients & GMs); • Adhere to methods & policies. <u>Less cost effective LEPs</u>: • Involved at NPD by LA and EI. GM, EI from pre-OJEU to M&O • Very-extremely important; • Accuracy is good-excellent; • Good-Excellent communication LEP & LA Client; • No collective observations; • Some elements were added or modified (LA, EI, GM); • Adhere to methods & policies. <u>Worse env. sustainable LEPs</u>: • Involved at NPD and M&O by LA, EI, GM. DB at NPD only. • Very-extremely important to all, except TAs; • No collective observations; • Good-Excellent communication LEP & Supply chain; • Some elements were added or modified (LAs); • Adhere to methods & policies. <u>Adversarial LEPs</u>: • Involved at NPD by LA, EI, GM, DB. EI at D&C, NPD and M&O. • Very-extremely important; • Accuracy is good-excellent; • Fair communication LEP & LA Client (D&B contractors); • No collective observations; • Good-excellent sharing of data; • Poor or not achievable to GMs (but good-excellent to DBs); • Some elements were added or modified (LAs); • Adhere to methods & policies.
,	**4) COST BENCHMARKING PROCEDURE**			

	Learning from organisations participating in strategic procurement systems			
	(1) Opportunities to learn in <u>better</u> performing LEPs	**(1) Opportunities to learn in <u>worse</u> performing LEPs**	**(2) Collective learning points of key participants in <u>better</u> performing LEPs**	**(2) Collective learning points of key participants in <u>worse</u> performing LEPs**
	An approval criterion is for LEPs to demonstrate best VfM for any New Project by cost benchmarking the first representative New Project of each type, and any other New Project for which NPAP Stage 1 Approval is sought. A full description is in **Appendix G1** with detail in **Appendix K3**.			
	Cost Benchmarking in general has been a constant problem. QS firms were involved to demonstrate VfM but often could not give sufficient comfort to LAs. Cost variances can be big so it needs to be clear what the benchmark is, and what you benchmark against has to be a like-for-like comparison. How do you set benchmarks at a realistic level? You can only do that by comparing against a broader range of comparable schemes. **1.01 Substructure** Cost benchmark was set quite high on earlier projects so a more realistic level needed to be set. (3) **1.05 Services** Elemental benchmarks for 'Services' are subject to lots of LA interrogation, as these often fall outside the benchmark range. (1) **1.07 External Works** While heavily scrutinised by LAs, achieving cost within benchmark range can be hard for contractors due to specific site conditions (demolishment, brown / green field, or external works). (3,7) **1.08 Abnormal Costs** Abnormals can turn out higher due to specific conditions on site (brown / green field, external works, demolishment). Cost plans have a limit for abnormals but LAs and lenders keep asking D&B Co's to justify. Simply allocating high sums against abnormals devalues the benchmark process. (3,5,7) **1.09 Contractor's Preliminaries** Are often an issue as costs put forward are outside the benchmark range. Costs are normally higher than expected due to contractor systems and processes. (1) **1.10 Contingencies, OH&P and Inflation** Benchmarking these measures are a constant problem. QS firms are hired on behalf of LEPs to demonstrate VfM, often without sufficient confidence to LAs. (3)	Cost Benchmarking in general has been a constant problem. QS firms were involved to demonstrate VfM but often could not give sufficient comfort to LAs. **1.01 Substructure** Cost benchmark was set quite high on earlier projects so a more realistic level needed to be set. This was due to a wide variation of specific site conditions (brown field, green field, demolishment, external works). (6) **1.08 Abnormal Costs** Abnormals can turn out higher due to specific conditions on site (brown / green field, external works, demolishment). Contractors keep having to justify costs. (2) **1.09 Contractor's Preliminaries** Costs for preliminaries are often too high for LAs so they challenge it more compared to other elements. GMs point out that prices are often sourced from single suppliers. (4) **1.10 Contingencies, OH&P and Inflation** Too much time can be spend on efforts to make savings on relatively small sums for contingencies, OH&P and inflation. Consequently, proposals delay and may end up outside the affordability window for different reasons, e.g. increased RPI rates and PFI swaps. (6)	<u>Lower Capex LEPs</u>: • Very-extremely important; • Accuracy is fair to contractors, but good-excellent to investors; • Adhere to methods & policies. <u>More cost effective LEPs</u>: • No collective observations; • No collective observations. <u>Better env. sustainable LEPs</u>: • Very-extremely important to all (except FM); • No collective observations; • No collective observations. <u>Cohesive LEPs</u>: • Very-extremely important; • No collective observations; • No collective observations;	<u>Higher Capex LEPs</u>: • Very-extremely important; • No collective observations; • No collective observations. <u>Less cost effective LEPs</u>: • Involved from pre-OJEU to M&O stage by GM; • Very-extremely important. <u>Worse env. sustainable LEPs</u>: • No collective observations; • Accuracy is good-excellent; • Adhere to methods & policies. <u>Adversarial LEPs</u>: • Very-extremely important to all (except TA); • Accuracy is good-excellent; • Only fair to achieve (GM).

Table 2: Findings from LEPs about 'Implementation & Management Processes'

CHECK --- Enabling Infrastructure (Mechanisms and Systems)

	Learning from organisations participating in strategic procurement systems			
	(1) Opportunities to learn in <u>better</u> performing LEPs	**(1) Opportunities to learn in <u>worse</u> performing LEPs**	**(2) Collective learning points of key participants in <u>better</u> performing LEPs**	**(2) Collective learning points of key participants in <u>worse</u> performing LEPs**
--- CHECK --- Enabling Infrastructure	**5) PFI PAYMENT MECHANISM & PMS** A standard PFI payment mechanism and PMS is available for PFI projects, under which LAs make Unitary Charge payments for the life of the contract to the SPV for the provision of services to the standard set out in the Output Specification. LAs have the right to make payment deductions if service standards set out in the output specification are not met. A full description is in **Appendix G1** and a breakdown is in **Appendix K3**.			
	1.01 Helpdesk system LEPs are still not confident that Helpdesk information is accurate as per the contract. This creates a lot of work for the LA that they should not be doing. If managed and operated by a third party the challenge can be even bigger. (7) **2.00 Domestics - Cleaning, Waste and Pest Control** It is all about first impressions and maintaining standards to avoid unavailability. Inconsistent quality of cleanliness on multiple sites are judged by different LA/school staff. Due to resource restrictions (TUPE-ed staff) FMs struggle to attract skilled cleaners and supervisors. If there are issues with cleaning staff then those individuals need to be changed. TAs urge for better training and supervision. If tasks are not carried out properly they may cause damage to building, leading to long debates on failing / responsibility of services. (5,7) **2.03 Domestics - Cleaning all internal areas, surfaces, FF&E** It is all about first impressions but all FMs struggle to keep cleaning standards, avoid unavailability as buildings can sometimes be used up to 14 hours per day. (5) **7.00 Energy and utilities** GMs point to a dual responsibility to keep messages alive (switch things off, don't leave on standby etc). Due to TUPE rules there can be a learning curve with some FM staff. Just a training at handover is not sufficient when it comes to managing complex energy systems. Energy is always challenging in buildings that are naturally ventilated. Sometimes new installations (e.g. biomass boiler) don't run properly or have defects. (3) **7.06 Energy and Utilities Mgt - Service Delivery Plan** Challenging Energy Targets can become unachievable when consumption levels are trending up. Rising energy tariffs make the energy bills more expensive for schools, which puts pressure on FMs. Reason FMs struggle with utility targets is mainly due to a lack of experience. It is also difficult for FM to influence usage of the building by the end-users mainly due to a lack of training and experience by FM staff and users (3,5).	**1.01 Helpdesk system** LAs are anxious that Helpdesk data is not accurate as per the contract. This creates a lot of work for LAs that they should not be doing. One GM acknowledges the Helpdesk is not working properly. (2) **2.00 Domestics - Cleaning, Waste and Pest Control** Inconsistent quality of cleanliness on multiple sites are judged by different LA/school staff. FMs struggle to attract skilled cleaners and supervisors due to resource restrictions (TUPE-ed staff). If there are issues with staff then those individuals should be changed. GMs also refer to FM performance issues and TAs urge for better training and supervision. (2,4) **2.03 Domestics - Cleaning all internal areas, surfaces, FF&E** It is all about first impressions but all FMs struggle to keep cleaning standards, avoid unavailability. (2) **3.01 To provide a planned maintenance service** In particular Lenders TAs warn this is challenging. Due to high number of defects post-handover the FM service is not quite right yet. So it is down to relationships with schools to prioritise what is important. (8) **3.02 To provide a reactive maintenance service** LAs complain FMs underperform and there is debate on what the standard is. Reactive jobs close faster if PFIs have response / rectification times with provisions allowing LAs to incur deductions. The interpretation of 'reactive' means relationships with schools help prioritising what is important to address. D&B schools with FM contracts should realise the PMS looks differently to PFI schools. Also, instant chasing outstanding defects and a lack of feedback from Helpdesk to open jobs often lead to a disturbed service (2,6,8) **4.03 Surfaces** Keeping surfaces (grassed areas, all-weather pitches, pitch markings, etc) to standard can be challenging, especially during winters with snow. There are difficult experiences with schools who expect areas to be clean at all times, leading to a debate on what the standard is. (8) **7.00 Energy and utilities Mgt** Energy Targets continue to be a challenge to meet, in particular in naturally ventilated buildings. It is also hard for FM to influence end-	<u>Lower Capex LEPs</u>: • Involved from NPD to M&O by <u>all</u> parties, except DBs; GMs & TAs involved from FC onwards. • Very-extremely important to <u>all</u> participants. • Accuracy is good to excellent; • No collective observations; • Fair communication LEP & Supply chain (LA Client), Good-Excellent (FMs); • Good-excellent sharing of data; • No collective observations; • No collective observations. <u>More cost effective LEPs</u>: • Involved at M&O stage only; • Very-extremely important; • Accuracy is good to excellent; • No collective observations; • No collective observations; • No collective observations; • No collective observations; • No collective observations. <u>Better env. sustainable LEPs</u>: • Involved at M&O stage only. • Very-extremely important to <u>all</u> participants. • Accuracy is good to excellent; • Fair communication LEP & Supply chain (LA Client); • Some elements were added or modified (GMs); • Adhere to methods & policies. <u>Cohesive LEPs</u>: • Involved at M&O stage only. • Very-extremely important to <u>all</u> participants. • Accuracy is good to excellent; • Good-Excellent communication LEP & LA Client; • Fair communication LEP & Supply chain (LA Client); • No collective observations; • No collective observations; • Some elements were added or modified (FMs); • Adhere to methods & policies.	<u>Higher Capex LEPs</u>: • Involved at M&O stage only by LA, EI, GM, FM; • Very-extremely important to <u>all</u> participants. • Accuracy is good to excellent; • Good-Excellent communication LEP & LA Client; • Fair communication LEP & Supply chain (LA Client), Good-Excellent (GMs & FMs); • Good-excellent sharing of data; • Some elements were added or modified (GMs); • Adhere to methods & policies. <u>Less cost effective LEPs</u>: • Involved at M&O stage only. GMs are involved from OJEU onward. • Very-extremely important to all, except D&B contractors. • Accuracy is good to excellent; • Good-Excellent communication LEP & LA Client; • Fair communication LEP & Supply chain (LA Client); • Good-excellent achievable; • Some elements were added or modified (FMs); • Adhere to methods & policies. <u>Worse env. sustainable LEPs</u>: • Involved at M&O stage only. • Very-extremely important to all, except D&B contractors; • Accuracy is good to excellent, but only Fair according to TAs; • Fair communication LEP & Supply chain (LA Client); • No collective observations; • No collective observations. <u>Adversarial LEPs</u>: • Involved at D&C and M&O stages. LA, EI, TA are involved at D&B, NPD and M&O stages. • Very-extremely important to all, except D&B contractors. • No collective observations; • No collective observations; • Fair communication LEP & Supply chain (LA Client); • Good-excellent sharing of data, except for LAs who say it's fair; • Fair at best to achieve (LAs); • No changes were made to the schedule; • No collective observations.

Learning from organisations participating in strategic procurement systems			
(1) Opportunities to learn in <u>better</u> performing LEPs	**(1) Opportunities to learn in <u>worse</u> performing LEPs**	**(2) Collective learning points of key participants in <u>better</u> performing LEPs**	**(2) Collective learning points of key participants in <u>worse</u> performing LEPs**
	user behaviour of schools. There is a dual responsibility to regularly keep messages alive (switch lights / machines off, don't leave screens / pc's on standby etc). Also due to TUPE system in place there is a huge learning curve for FM staff. Just a training at handover is insufficient to handle complex school energy systems. Another issue pertains to equipment not working as it should, or utilities consumption being higher than benchmark prices, enacting the PFI pain-gain sharing mechanism. (6,8) **9.00 Catering** Failure to meet requirements of halal meat, UK guideline targets for nutrition and subsidies. Catering companies also lack innovative approaches and appear to not take the job very seriously. (2)		
6) NON-PFI FM/ICT PAYMENT MECHANISM & PMS A full description is in **Appendix G1** and a breakdown is in **Appendix K3**.			
No observations from better performing LEPs.	**1.00 ICT Installation Services** LAs and investors are unhappy with the area wide service levels so contracts are terminated. A reactive performance regime drives a behavioural issue to only prioritise rectifications. ICT Service Providers are constantly mitigating against a commercial position. LEPs have signed ICT Managed Services contracts for a large portfolio, but despite that half of that is cancelled along with BSF, LAs fail to change expectations about the service. (2) **3.03 Energy and utilities mgt** Most FMs find it challenging as pupils can be difficult to control, (e.g. they can leave lights/pc's on or keep windows open when they shouldn't). If not managed with the schools it exposes the LEP with associated risks on the FM Payment Mechanism. Secondly, FM site engineers need to better understand specific processes and systems to allow proper energy and utility management. Lastly, energy use can be higher than benchmark pricing putting pressures on utility consumption targets. (6,8) **4.01 Domestics: Cleaning, Waste and Pest Control** In particular LAs express this is as challenging. Agreeing rectification periods has been difficult during negotiation stage. At operational stage, the heavy usage of schools (sometimes up to 14 hours per day) can make it challenging for FM Co to meet service levels. (8)	<u>Lower Capex LEPs</u>: • Involved from NPD to M&O by LA, EI, GM and FM; GMs are involved from FC onwards; • Very-extremely important. <u>More cost effective LEPs</u>: • Involved at M&O stage only; • Very-extremely important; • No collective observations. <u>Better env. sustainable LEPs</u>: • No collective observations; • Very-extremely important; • No collective observations; • No collective observations. <u>Cohesive LEPs</u>: • No collective observations; • No collective observations; • No collective observations; • No collective observations; • No collective observations.	<u>Higher Capex LEPs</u>: • Involved at M&O stage by LA only; • Very-extremely important. <u>Less cost effective LEPs</u>: • Involved at M&O stage only; • Very-extremely important; • Accuracy is good to excellent. <u>Worse env. sustainable LEPs</u>: • Involved at M&O stage only; • Very-extremely important; • Accuracy is poor-very poor to LAs, while GMs and FMs say it is good-excellent. • Fair communication LEP & LA Client (LA Client); <u>Adversarial LEPs</u>: • Involved at D&C and M&O stages. LAs are involved at D&B, NPD and M&O stages; • Very-extremely important; • Fair communication LEP & LA Client (LA Client); • Fair communication LEP & Supply chain (LA Client); • Fair sharing of data (LA Client).

Table 3: Findings from LEPs about the Enabling Infrastructure

ACT --- Portfolio Measurement & Improvement

	Learning from organisations participating in strategic procurement systems			
	(1) Opportunities to learn in <u>better</u> performing LEPs	**(1) Opportunities to learn in <u>worse</u> performing LEPs**	**(2) Collective learning points of key participants in <u>better</u> performing LEPs**	**(2) Collective learning points of key participants in <u>worse</u> performing LEPs**
--- ACT --- Measurement & Improvement	**7) KEY PERFORMANCE INDICATORS** The KPIs in SPA Schedule 14 Part 2, are an approval criterion for LEPs to demonstrate a good track record performance on the delivery of previously approved projects. A full description is in **Appendix G1** and a breakdown is in **Appendix K3**.			
	2.07 Environmental performance During construction the KPI for recycling can be challenging. On operational contracts meeting energy utility targets remains a constant challenge. If targets for utilities consumption are not set correctly at the outset, it leads to a penalty charge as risks are shared. Better understanding is needed of energy use and projected utilisation of buildings before committing to a target. Because utility consumption is reviewed annually targets seem to be constantly changing. (3,7) **3.05 Time Predictability (D&C)** Meeting programmed deadlines can cause difficulties with LAs (1) **4.00 Costs** Budgets are phenomenally tight in order to demonstrate and achieve VfM and there is an element of the LA not really believing what we private sector reports upon. It can take a long time to demonstrate although as a hard (quantitative) KPI it is easier to calculate (5). **4.01 Average total cost of construction** LAs keep stressing this cost KPI and the ability to control Client led design scope creep is challenging. The average cost £/m² reduced in the course of the BSF programme so budgets are phenomenally tight in order to demonstrate VfM. This can take a long time to demonstrate and besides there is an element of LAs not really believing what the private sector reports upon. LAs often point to this KPI so a Value Engineering is often needed. (1,3) **4.07 Predictability of abnormal costs** Abnormal costs are very hard to predict. It is a source of tension between parties due to budget constraints and affordability predictability issues. (1,3) **5.03 Customer Satisfaction - Operational phase** Difficult to achieve due to a gap between customer understanding and expectations of the service and contracts with output specifications. End-users expect a new shiny building every day. There is a level of LA ambiguity on what FMs reports upon along with some financial reasoning. Headteachers have a big say in this KPI. (1) **6.02 Schools community use** A BSF legacy issue that LEPs still need to deliver whilst at the same time schools and LAs do not push it enough to make it work. There can	**2.07 Environmental performance** This ever changing KPI demands contractors to understand energy usage and the way a building will be used. Waste recycling is particularly challenging. (2) **2.08 Disruption of school operations** Sites that remain occupied can take many phases and need a lot of liaison with schools at each phase to avoid disruption. It can also be unavoidable at heavy construction stages so schools can use the KPI as a check book. Many schemes have a September completion date, at the start of a new Academic year. This is a busy time generally, so it is extra critical for contractors to ensure a smooth handover. (8) **4.01 Average total cost of construction (£/m²)** Ability to control Client led design scope creep can make it hard to meet while LAs insist on the KPI. It can take a long time to prove. There is a factor of LAs not really believing what the private sector reports. The cost KPI reduced in the course of the BSF programme so budgets are phenomenally tight in order to demonstrate VfM. (2,8) **4.04 Life cycle costs** GMs express this is challenging. Expectation on life-cycle to meet industry standard durability is unrealistic for schools. Pupils can cause wear-and-tear faster than adults (e.g. painting). Accounting for technology changes over a 25-year period in the lifecycle cost model proves challenging too. (8) **4.07 Predictability of abnormal costs** GMs point out this is challenging and some LEPs are sceptical about what they are measuring against when benchmarking is not carried out as accurately as it could be. The PfS/EFA benchmark data that has been used is outdated, so if LEPs meet the KPI set, the benchmarking of it is a difficult thing to do. Overall this has been very difficult, LEPs were under massive pressure as the LA wanted better VfM. (8) **5.03 Customer Satisfaction - Operational phase** Proving difficult for LEPs to achieve due to an expectation gap between the end-users who expect a new shiny building every day and what is in the contract. Besides, due to the subjective nature of data there is an element of LA ambiguity on what FM Co report upon along with some	<u>1. Lower Capex LEPs</u>: • Involved at D&C, NPD and M&O stage by LA, EI, GM, DB (+FM at M&O stage); • No collective observations; • Accuracy is fair at best to DBs; • Good-Excellent communication LEP & Supply chain; • Fair at best to achieve to FMs; • Some elements were added or modified (EIs and FMs); • Adhere to methods & policies. <u>3. More cost effective LEPs</u>: • Involved at D&C, NPD and M&O stage by LA, EI, GM (+DB at NPD and +FM at M&O stage only); • Very-extremely important, though only somewhat important to DBs; • No collective observations; • Good-Excellent communication LEP & LA Client; • Good-Excellent communication LEP & Supply chain; • Good-excellent sharing of data; • No collective observations; • Some elements were added or modified (EIs and GMs); • Adhere to methods & policies. <u>5. Better env. sustainable LEPs</u>: • Involved at D&C, NPD and M&O stage by LA, EI, DB (+FM at M&O stage); LAs involved from OJEU; • Very-extremely important; • No collective observations; • No collective observations; • Fair at best to achieve (GM, FM), while good-excellent to DB; • No collective observations. <u>7. Cohesive LEPs</u>: • Involved at NPD stage only by GM, DB, FM. GMs are involved at D&C, NPD and M&O stages; • Very-extremely important; • No collective observations; • Good-Excellent communication LEP & Supply chain; • Fair at best to achieve for FMs, while good-excellent to DBs;	<u>2. Higher Capex LEPs</u>: • Involved at NPD and M&O stage by LA, GM, DB (+FM at M&O stage); LAs involved at all stages. • Very-extremely important to <u>all</u> participants, but contractors; • No collective observations; • Good-Excellent communication LEP & Supply chain; • Fair at best to achieve to GMs, Good-excellent to contractors; • No collective observations; • No collective observations. <u>4. Less cost effective LEPs</u>: • Involved at M&O stage only by LA, GM, FM. GMs are involved from pre-OJEU stages onwards. • Very-extremely important; • Accuracy is fair at best to GMs, while good-excellent to LAs, FMs; • Good-Excellent communication LEP & LA Client; • Good-Excellent communication LEP & Supply chain; • No collective observations; • Fair at best to achieve (GMs); • Some elements were added or modified (LAs and FMs); • No collective observations. <u>6. Worse env. sustainable LEPs</u>: • Involved at NPD and M&O stage by LA, EI, GM (+DB at NPD and +FM at M&O stage only); • Only somewhat important to DBs, while very-extremely important to EIs and FMs; • Accuracy is fair at best to DBs, while good-excellent to EIs, • Good-Excellent communication LEP & Supply chain; • Good-excellent achievable; • Some elements were added or modified (EIs and DBs). <u>8. Adversarial LEPs</u>: • Involved at D&C, NPD and M&O stage by LA, EI, GM (+DB at FC, NPD and +FM at M&O stage); • Only somewhat important to DBs while very-extremely important to LAs and FMs; • Accuracy is poor-very poor to EIs and GMs. • Good-Excellent communication LEP & Supply chain; • No collective observations;

Learning from organisations participating in strategic procurement systems				
	(1) Opportunities to learn in <u>better</u> performing LEPs	**(1) Opportunities to learn in <u>worse</u> performing LEPs**	**(2) Collective learning points of key participants in <u>better</u> performing LEPs**	**(2) Collective learning points of key participants in <u>worse</u> performing LEPs**
	be KPIs for extended out-of-hours activity: community, leisure facility, training classes, student programs (traineeships, apprenticeships). These can be challenging due to a lack of local relations, and schools not pushing it. Schools can sign a 'Community Use Agreement' but due to existing local relationships it is not often pursued. The FM role is limited to closing and opening, LAs take care of advertising, etc. An FM staffing structure is not in place to meet expectations for community use and make income at any time. LAs run the schools only during pre-agreed opening hours. (5,7) **6.03 Popularity local schools** A BSF legacy issue that LEPs need to handle but cannot fully influence. LEPs can assist by constructing good quality buildings but popularity is determined by quality of teaching also, which they cannot influence. Getting the schools to accept this principle is challenging. (5)	financial reasoning, which is acknowledge by FMs. (6,8) **6.02 Schools community use** A BSF legacy issue that LEPs need to manage e.g. by providing training courses to schools. It is challenging due to a lack of local relationships, and schools not pushing it. Schools can sign a 'Community Use Agreement' but due to existing local relationships it is not often pursued while LAs run schools during pre-agreed opening hours. FMs find it hard to make community investing work other than opening and closing duties. LAs take care of advertising, etc. LEPs only talk about it but don't deliver. (2,4) **6.03 Popularity local schools** Not much influence is possible from LEPs to achieve this KPI. Engaging the community can be challenging due to mixed local relationships. LEPs can assist by constructing good quality buildings but popularity is determined by quality of teaching also, which they cannot influence(2)	• Some elements were added or modified to FMs, while DBs say no changes were made.	• Some elements were added or modified to LAs, while GMs and FMs say no changes were made.
	8) CONTINUOUS IMPROVEMENT TARGETS An approval criterion for LEPs to demonstrate long-term VfM against Continuous Improvement Targets for the initial project, and any New Project. A full description is in **Appendix G1** and a breakdown is in **Appendix K3**.			
	1.01 Reduce construction waste LAs stress the importance for contractors to deliver this CIT. Initially it can be hard to achieve but trends improve whilst the target becomes increasingly challenging. Besides smaller projects are often on tighter sites making it hard to handle waste. Contractors should look at Design Stage differently on how to handle waste. One started with brickwork and blocks at phase 1 projects and in phase 3 it moved to off-site manufacturing. (7) **1.04 Reductions in average construction costs** LEPs and contractors face extreme challenges to keep delivering a consistent quality of capital projects whilst continuing to reduce £/m^2. They also have to meet general UK legislation with higher demands on asset performance. For LAs it means they get better performing assets for the same costs. (7)	**1.01 Reduce construction waste** Initially this can be challenging but trends improve while the CIT get more challenging. Also, smaller projects are often built on tighter sites making it hard to treat waste. Contractors should look at Design Stage differently how to handle waste. One used brickwork and blocks at phase 1 projects and in phase 3 it moved to off-site manufacturing. (2,4) **1.04 Reductions in average construction costs** LEPs and contractors face extreme challenges to keep delivering a consistent quality of capital projects whilst continuing to reduce £/m^2. They also have to meet general UK legislation with higher demands on asset performance. (4) **3.01 Faster timescales** Contractors can work fast but LAs cannot always cope with the speed. Some LEP achieved 25 projects in five years. An investor explained all building elements are manufactured off-site, so not being constrained by weather condition is faster but not cheaper. It can be difficult to reduce timescales when having a phased project, often one area has to finish before moving to another. (2)	<u>1. Lower Capex LEPs</u>: • Only somewhat important to LAs and EIs, while very-extremely important to FMs. <u>3. More cost effective LEPs</u>: • Involved at M&O stage only by EI, GM, FM. • No collective observations; • No collective observations; • No collective observations; • No collective observations. <u>5. Better env. sustainable LEPs</u>: • Involved at NPD stage only by EI, GM, DB. GMs are involved at D&C, NPD and M&O stages; • No collective observations; • No collective observations. <u>7. Cohesive LEPs</u>: • Very-extremely important; • Accuracy is fair at best to EIs, while good-excellent to GMs.	<u>2. Higher Capex LEPs</u>: • Very-extremely important. <u>4. Less cost effective LEPs</u>: • No collective observations. GMs are involved from pre-OJEU stages onwards. • Very-extremely important; • Accuracy is fair at best to EIs, while good-excellent to GMs; • Good-Excellent communication LEP & LA Client; • Some elements were added or modified (GMs). <u>6. Worse env. sustainable LEPs</u>: • No collective observations; • Only somewhat important to LAs and GMs; • Good-Excellent communication LEP & LA Client. <u>8. Adversarial LEPs</u>: • Only somewhat important to LAs; • Accuracy is poor-very poor to LAs

Table 4: Findings from LEPs about 'Portfolio Measurement & Improvement'

Appendix T

COLLECTIVE LEARNING OVER TIME

Appendix

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COLLECTIVE OBSERVATIONS AND LEARNING POINTS

1. Final version
2. Mark up version following industrial workshop

APPENDIX U1 – COLLECTIVE OBSERVATIONS AND LEARNING POINTS [FINAL VERSION]

APPENDIX U2 – COLLECTIVE OBSERVATIONS AND LEARNING POINTS [WORKSHOP MARKUP VERSION]

Appendix V

INDUSTRIAL VALIDATION WORKSHOP PACK

1. Invitation email;
2. Workshop instructions;
3. Profile summary;
4. Agenda;
5. Participants list;
6. Presentation slides;
7. Minutes of the workshop.