

The private finance initiative, project form and design innovation. The UK's hospitals programme.

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Abstract

This paper discusses the role of public demand, in the form of a government procurement policy, in generating innovative solutions for healthcare infrastructure. It considers the effects of the *project delivery system* (planning, finance, construction and operation) for new hospitals on *design innovation*. It focuses on hospitals built under the UK's private finance initiative (PFI), which was partly introduced to inject increased innovation into hospital delivery. We use case studies of six early PFI hospitals to argue that the introduction of PFI has increased the complexity at the interface between project delivery and hospital operational functions. The result is a project delivery model which yields less innovative outcomes and produces facilities that might not be able to cope with future changes in demand. The paper suggests that new public procurement models do not automatically provide efficiency and innovation benefits.

Keywords

Public procurement; Private finance; Hospitals; Design innovation

1. Introduction

Increased interest in the use of ‘public demand’ to secure innovative solutions and products, and improve the delivery of public services, was recently highlighted by Edler and Georghiou (2007). Drawing on earlier work by Dalpé et al. (1992) which shows how the state often acts as a lead user in stimulating innovation, Edler and Georghiou argue that public procurement is one of a range of measures for delivering innovative public infrastructure and services. The UK is highlighted for its systematic and advanced approach, with the procurement strategies of the National Health Service (NHS) singled out as leading examples of efforts to change practice.

This paper extends the work of Edler and Georghiou by empirically examining the use of the ‘private finance initiative’ (PFI) to procure and operate new NHS hospitals. This is currently the main procurement route for this type of healthcare infrastructure, and one which government has endorsed as a means of stimulating innovation. Specifically, we investigate the relationship between the *project delivery system* (the relationship between the funders, contractors and the public sector client) and *design innovation*. Design innovation is seen here in terms of physical adaptability – the ability of a building to economically accommodate future changing requirements. This has been a long-standing challenge in the provision of healthcare infrastructure, where technologies, policies and services are subject to much shorter lifecycles than that of the relatively inflexible built assets that support them. The need for adaptability was reiterated in 2001 by the then Secretary of State for Health, who argued that innovative new hospital designs could help raise care standards and ensure the flexibility needed to plan for future medical advances (Dept. of Health, 2001).

The study draws on a conceptual framework for exploring project delivery within the rail transport sector developed by Geyer and Davies (2000). Applying this model to the healthcare sector, we argue that in its current form the PFI model is unable to promote the level of innovation in the design of hospital built assets needed to optimise their lifetime clinical efficiency. This is partly due to the relationship between (1) the project delivery and (2) hospital operational systems. Through six case studies of new PFI hospital projects, we suggest that instead of promoting a higher degree of integration

between the project delivery and hospital operational systems, the introduction of PFI has resulted in a separation between them. This has led to problems such as disrupted communications, complicated patterns of collaboration, misaligned goals and incentives and poor inter-project learning. The result is a project delivery model which may be producing facilities that are unable to adapt to future healthcare needs and health service innovations.

The next section provides a definition of ‘adaptability’, explains its importance with regard to current hospital developments, and argues that in this context adaptability can be regarded as innovation. We then outline the debate on the use of public demand as an engine for innovation and consider the emergence of PFI as a procurement vehicle for modernising the UK’s healthcare infrastructure. The following section describes a conceptual framework for understanding the relationship between PFI as a project delivery mechanism and innovation in hospital design. We also outline three potential reasons why innovation might be hard under PFI, in its current configuration. These relate to the complexity at the interfaces between the various components of the hospital project-operational system, the allocation of risk and rewards within this system, and the impact of PFI on opportunities for intra- and inter-project learning. These questions are then discussed using findings from the six case studies. Finally, we draw conclusions on the policy and practice implications of the empirical findings and the usefulness of the conceptual framework.

2. Public procurement, PFI and the modernisation of the UK’s healthcare infrastructure

The current interest in demand-side approaches to stimulating innovation, including the use of public demand, dates back to the early 1980s when Rothwell and Zegveld (1981) argued that state procurement could be a more significant trigger than R&D subsidies. As Edler and Georghiou (2007) point out, the use of public procurement for promoting innovation is now well developed in the UK. For example, the Department of Trade and Industry has highlighted the innovation potential of government as an influential and demanding customer (DTI, 2003a and b; cf. CBI & Qinetiq, 2006; Taylor, 2006). At the European Union level, directives on procurement (2004/18/EC and 2004/17/EC) have

introduced opportunities for public authorities to specify innovative solutions through functional performance requirements, opening up bids to alternative ideas, and allowing technical and competitive dialogues between purchaser and supplier.

Edler and Georghiou (2007) draw a distinction between two public procurement models. First, strategic procurement policies may be designed to encourage demand for certain technologies, products or services in order to stimulate the market within a particular industrial sector. Second, procurement may be organised to ensure that innovation is an essential criterion in the tendering process. An important rationale for such a use of public procurement is the perception that purchasing innovative solutions potentially improves public infrastructure and services in general. In this regard the procurement strategies of the National Health Service (NHS) could be seen as a leading example of efforts to change practice.

2.1 The PFI hospitals programme

In the late 1990s the UK government embarked on an ambitious agenda of health system reform (NHS 2000). This included a modernisation programme for its outdated and inappropriate built infrastructure, worth over £40bn. Introducing the programme, the Secretary of State for Health stated ‘We cannot build an NHS for the 21st century with hospitals built in the 19th century. The hospital building programme is a key part of the Government’s ten year modernisation programme for the health service’ (Dept. of Health, 1998). To stimulate investment, various forms of public-private partnership were introduced, whereby a capital project for a public sector client was procured and often operated by a private sector consortium. The Private Finance Initiative (PFI), one of several models of public-private partnership (PPP), is the main funding mechanism for hospitals (Boyle and Harrison 2000) and has been used for over 90% of all capital schemes in the healthcare sector in England since 1997¹.

Under the PFI, several private sector partners form a consortium, the ‘special purpose vehicle’ (SPV), to deliver capital assets and some services to an NHS hospital trust on a

¹ PFI and public capital funded projects over £10 million, given the go-ahead since May 1997 (England) updated to 17 October 2006. Available from: <http://www.dh.gov.uk/en/Procurementandproposals/Publicprivatepartnership/Privatefinanceinitiative/index.htm> - accessed 09.06.07

long-term contract, generally lasting thirty years or more. In hospital development a PFI arrangement typically involves finance, design, construction, facilities management and sometimes 'soft facilities management' (non-core services such as cleaning and catering), for which fees have to be paid over the duration of the contract. The hospital trust maintains sole responsibility for all clinical services.

For the government the rationale for the introduction of PFI into hospital procurement was threefold. First, it was seen as a way of exploiting the financial strength of the private sector and renewing the healthcare built infrastructure faster than would be the case under conventional public funding models. Second, PFI was felt to be a way of maintaining facilities over the contract lifetime. Huge maintenance backlogs due to underinvestment are frequently the reason for existing facilities needing replacement. Third – and most pertinent for this paper – the government saw PFI as a way of taking advantage of the private sector's 'experience and skills in order to bring innovative solutions to the needs of the health service' (NHS Executive 1999: 4). This has been a persistent theme in government statements on modernisation of the UK's healthcare infrastructure. It was reiterated by a health minister in 2004, who argued that PFI is

'much more than a new hospital building programme ... It has to become the principal mechanism for getting new design solutions into the NHS, not just in buildings but in processes too ... Innovation can ... accelerate improvements in care delivery and care outcomes and increase clinical capacity, e.g. through new treatment centres' (Hutton 9 June 2004).

Within the policy debate around the future provision of healthcare infrastructure there has often been an elision between the need for innovation and the need for increased adaptability to cope with future unpredictable needs arising from changing demand or the introduction of new technologies or care practices. For example, the Secretary of State for Health said in 2001 that 'new hospitals need innovative ward designs to help raise care standards and ensure flexibility to plan for future medical advances' (Dept. of Health, 2001).

The need for adaptability in healthcare infrastructure does not only arise from changing demand and technological or care service innovation but also through the characteristics

of PFI as a delivery model. This is because of the way risk is allocated between the public and private sectors. A key consideration of government in establishing the PFI was to transfer risk from the public to the private sector. Some operational risks that traditionally rested with the client (i.e. the NHS) are transferred to the private consortium, but the risks arising from technical obsolescence, changing regulations or policies, and unidentified future healthcare needs – including falling demand for services – ultimately remain with the hospital trust (Pollock et al. 2002).

Since the public sector still carries all the demand risk and because of the long-term contractual arrangements between the private and the public sector, it is essential that PFI delivers healthcare facilities that are able to accommodate future change and are optimally usable for the NHS during the entire lifecycle of the asset. A key question is therefore whether the PFI model is structurally capable of stimulating innovative design solutions to reduce the risk of potential future obsolescence arising from fast changing care delivery and technology lifecycles. Concern about adaptability and ‘future-proofing’ of healthcare facilities was raised early in the PFI hospital programme (NHS Confederation 2004), along with concerns about the very tight procurement deadlines and lack of time to plan adequately, despite the long-term commitment typical of PFI contracts (CABE 2000).

2.2 Adaptability in healthcare facilities as ‘innovation’

Adaptability has long been highlighted as important in planning and delivering healthcare facilities, in recognition of the speed of change in services and technologies. During the 1960s and 1970s – the previous wave of major hospital investment in the UK – the government sought to systematically rationalise and industrialise hospital construction. Several innovative design solutions were developed and put into practice. The emphasis was on reducing variety in dimensions, components and assemblies to achieve economies of scale, quality control and cost predictability, as well as future adaptability (Green and Moss 1971; Weeks 1965; Francis et al. 1999). For example, the ‘Harness’ approach introduced design flexibility for a variety of functions within specified zones and the ‘Nucleus’ model involved a series of standardised elements from which hospitals of different sizes and shapes could be assembled. Notions of

‘indeterminate architecture’, whereby built assets were seen as continuously evolving, underpinned the design and construction of the Northwick Park Hospital.

Following this period there was almost no new construction until the PFI was introduced in the late 1990s. The momentum for innovative solutions was lost as the organisational infrastructure for hospital planning and delivery was dismantled (see below, section 6). Lessons on adaptability from the 1960s and 1970s are now being rediscovered, in a new organisational and funding context. It has been argued that departures from currently prevailing practices can be seen as a form of innovation (e.g. Meyer and Goes 1988) and design ‘adaptability’ can thus be seen as a form of innovation. Although it involves a combination of old ideas, it is perceived as novel within the current context and innovative thinking is needed to make it work.

We have described how there is increased interest in the use of public procurement as a way of stimulating innovation and also the rationale for and use of PFI within the UK government’s healthcare infrastructure modernisation programme. We have also noted how flexibility and adaptability are regarded as essential for meeting future healthcare needs, and that the long contracts under PFI reinforce the need for innovative design solutions to achieve this. We will now describe a conceptual framework for understanding the interactions between the various organisations involved in PFI hospital projects interact and outline a series of research questions which we explore through our case studies.

3. Conceptual approach and research questions

In order to investigate the relationship between the PFI delivery mechanism and innovation in hospital design it is necessary to consider the interfaces between the various organisations involved in hospital projects. A framework proposed by Geyer and Davies (2000), combining concepts of ‘complex products and systems’ (CoPS) and ‘large technical systems’ (LTS), provides some insight into the innovation processes in complex infrastructure project environments.

The core organisational components in an LTS are (a) project-based CoPS suppliers and (b) the system operators or service suppliers. There is an interface between the project supply network and the operational system. Innovation activities need to be understood in terms of an interactive relationship between the project which is situated in the LTS and the operational system which the project supports. Both sides – the project and the operational systems – influence and shape each other, creating a dynamic that stimulates innovative behaviour, forming a ‘project-system innovation cycle’.

This framework is useful for investigating innovative behaviour in large hospital developments since these display hallmarks of CoPS – they are high value and engineering intensive, use many customised components and are often delivered by networks of companies (Hobday 1998). Since CoPS are often one-off projects, they involve a considerable degree of risk and therefore need close collaboration between users and project suppliers (Hobday 2000). Geyer and Davies (2000) argue that in this type of environment systems integration and effective coordination capabilities play important roles in successful innovation. Close collaboration and open communication has long been seen as essential for successful innovation in the construction industry and overcoming problems associated with its focus on the delivery of one-off, highly customised products (e.g. Barlow et al. 1997; Slaughter 1998; Winch 1998; Barlow 2000; Slaughter 2000; Dulaimi et al. 2003; Leiringer 2006), as well as more generally in CoPS.

There has been some debate over the potential of PPP models for improving construction processes and stimulating innovation. Barlow et al. (1997) argued that PFI – at least as it was then emerging in the UK – was potentially detrimental to true partnering between project collaborators because of the lack of risk-reward sharing mechanisms. Others have suggested that the emergence of integrated procurement contexts under PFI may provide a much more supportive climate for collaborative ways of working (Green et al. 2004). Leiringer (2006) hypothesises that greater clarity over the assumed risks, due to more explicit risk-transfer under a PPP, might benefit innovative activities. Some feel that as a key coordinating agency, taking on financial, design and operational responsibility for the fixed capital asset, SPVs provide system integration and coordination capabilities (Davies and Salter 2006).

We suggest that within the hospital development sector, under the current form of PFI, there is a missing link between infrastructure provision (project execution) and care delivery (operation) because systems integration and coordination capabilities are weak. This might significantly impede innovative design solutions which could help to accommodate future healthcare needs. Building on this contention, we now outline three research questions regarding the potential implications of PFI for the delivery of adaptable healthcare projects.

The first relates to the complexity at the interfaces between the various components of the hospital project-operational system. Brady et al. (2005) argue that the use of PPPs for major infrastructure means that responsibility coordinating planning, design, construction and operation has shifted from public bodies to the private sector, without creating any more integration between the different project delivery stages. In hospital development the PFI not only resulted in a strict separation between infrastructure provision and care delivery operations, but it also inserted another administrative layer between the design capability (architects and planners) and the clinical users (NHS) due to the introduction of SPVs. Together, these features potentially hinder communication across the interface between care and infrastructure providers, making collaboration more difficult.

The second question involves the allocation of risk and rewards within the project and operational systems. Construction contracts typically push project participants to employ well tried methods to reduce their project risks. A number of commentators have emphasised the importance of mechanisms allowing the rewards for innovation to be distributed according to the risk that each party has assumed (Barlow et al. 1997; Winch 1998; Barlow 2000; Slaughter 2000). Leiringer (2006) found that on PPP projects project funders were unwilling to assume any additional risks often associated with innovation. Under the current PFI model the contract is designed to ensure as much certainty as possible, as early as possible in the design process, in order to minimise project risks. This potentially reduces the likelihood of innovative behaviour later on as the project unfolds. This problem is compounded by the isolation of the SPV from clinical operations – under the current PFI model the SPV is incentivised to reduce its direct costs but there are no incentives to innovate in order to improve clinical care processes.

Third, innovation is potentially hindered through reduced opportunities for intra- and inter-project learning. Feedback loops from earlier to later project stages have been found to be useful in enhancing project delivery and project outcomes (Geyer and Davies 2000). In addition, information relating to performance and operational requirements fed back from the operational side into project development helps to increase innovation activities and improve project outcomes (Davies 2004).

Learning from project to project is another important aspect of innovative behaviour in project-based firms (Winch 1998; Gann 2000; Gann and Salter 2000). However, it has often been noted that learning from experiences is potentially lost in construction since projects are typically executed by temporary networks of firms that disband after the project is completed (e.g. Akintoye et al. 2003).

4. Methodology

The research followed a three-stage process that involved detailed case studies of PFI schemes and shorter case studies of hospitals developed before the introduction of PFI. In the first stage we conducted informal background interviews with nineteen domain experts in order to build a thorough understanding of the issues and help to identify possible case studies. Interviewees included senior representatives from the NHS, the Department of Health, construction industries, architectural and legal practices, and PFI consultants.

Second, short case studies of six hospitals known for design innovativeness and built during the pre-PFI delivery model were undertaken. These case studies involved informal interviews with health architects and planners with knowledge of the hospitals, site visits, and evaluation of background documentary material.

Third, the main data collection phase involved detailed case studies of the planning, delivery and operation process of six case study PFI schemes, around a quarter of all the schemes in the initial PFI phase (see table 1). We are required to maintain confidentiality over the locations of these hospitals. The research included semi-

structured interviews with key stakeholders, site visits and analysis of background documentary material. Data collection was carried out over a nine month period in the second half of 2005 and early 2006.

The selection of suitable cases proved difficult – good examples of adaptable and innovative PFI schemes could neither be identified in the discussions with experts nor through the specialist press or other official reports. The examples chosen were largely based on recommendations of experts who felt that the schemes were representative of a suitable range of design and contextual features.

Thirty-one key stakeholders from SPVs and the hospital authorities were interviewed, including trust project directors, trust clinical planners, managers of SPVs and contractors, facilities management service managers, and architects. The semi-structured interviews were guided by an interview protocol consisting of forty open-ended questions, including sub-questions to substantiate given answers. In some cases two interviewers were present. All interviewees were assured of confidentiality to elicit as much unrestricted information as possible. Interviews were taped, when possible, or manually recorded during the discussion. All findings from the case studies were analysed in an evaluation matrix to explore common themes.

The preliminary research findings were then presented to the project advisory board (comprising experts from healthcare architecture and construction) and at a workshop including other academic researchers and 45 representatives from healthcare policy and services, and the construction supply chain.

Table 1 (Case study sites) about here

5. Findings from case studies

We have grouped our findings into four subsections, addressing the research questions discussed above and more general issues. We then consider the extent to which PFI – as a form of public procurement – has acted as a stimulus to innovation within healthcare infrastructure provision.

5.1 Contracts, communication and collaboration

We outlined above how the additional layer of the SPV potentially acts as a barrier between the project delivery and healthcare operational systems, disrupting communication patterns and creating difficulties for collaboration between the project stakeholders.

In a PFI project the main contract is between the hospital trust and the SPV. It was found that the case study SPVs often insisted to project stakeholders that all communication with planners and subcontractors had to go through them. It was repeatedly pointed out that since the hospital trust is not the owner of the facility, the SPV only assigns this partner a limited role in project delivery – as the commercial manager for one contractor put it, ‘the client is the bank and the trust is just a tenant’. Collaboration after completion of the project was also felt by some trusts to be difficult – one interviewee compared the SPV to ‘a king in a castle’ since it was the leaseholder of the buildings and site and had to agree to any changes.

In several cases it was reported that the SPV was apprehensive of overly close relationships between the healthcare planners working for the trust and the architects. According to the director of planning for one trust,

‘We had very good relationships with (the) architects, which benefited the project. However, the SPV was concerned about this closeness and tried to prevent the close contact. Eventually, we were allowed to deal directly with the architects, though a representative of the SPV had to be present at each meeting, which slowed the process down’.

Some architects therefore believed their loyalties were divided as they were employed by the SPV’s contractor but felt responsible to the hospital trust and the users of the proposed facility. According to one architect, there was a feeling that the practice had to service two ‘clients’, the SPV *and* the hospital trust and its users. Another said that ‘our contract was with (the SPV) so we were not supposed to talk directly to the users (but) we talked to them anyway’. In this example, the relationship between the contractor, the

client and architect became very fragile, and the architect felt that while they got on well with the trust the SPV contractor ‘was a barrier between us’.

The contractual arrangements under the case study PFIs also caused problems in communication between the NHS trust and the project subcontractors. In one example, the trust and the soft facilities management supplier agreed to upgrade a catering outlet. This caused problems because the SPV would have been required to take on maintenance responsibilities beyond those specified in the original contractual.

In only one case study was the position of the SPV within the overall project structure seen as relatively unproblematic. Here, the SPV was described by interviewees from the hospital trust as an intermediary between the different stakeholders, providing a supporting role and aiding communication. In this case, the SPV wished to focus on commercial property development opportunities associated with hospitals and it was therefore concerned to develop a long-term relationship with the NHS. It therefore had a clear incentive to ensure good design quality and a degree of adaptability to allow for future commercial development. Generally, however, communication was seen as difficult, with a detrimental effect on collaboration, both during the project planning phase and during project execution.

During the project *planning phases* it was reported that feedback from the clinical operational side to the SPV and its subcontractors was neither direct, nor sufficiently timely. This hampered the planning process. One interviewee from a hospital trust felt that the SPV was unprepared for the amount of consultation and degree of involvement of clinical users required. In another case, the trust was unaware of the need for contractors and architects to have prior information on the medical equipment likely to be installed in order to plan for appropriate floor loadings and electrical capacities.

Hospital trusts themselves appeared to hinder the free flow of information from end users to the consortium during the planning phase. It was suggested that trusts were often content simply to receive a new hospital without becoming involved in detailed planning. According to one SPV director, ‘the trust thinks that procuring a PFI hospital is like buying a ready-made house and they do not realise how much input is required from them’. In this example the contractor’s director of construction felt that the trust

‘just saw the finished product but not the process. They would have liked to go away after financial close and have a finished hospital in several years’. It was also claimed that trusts often underestimated the importance of their input into the delivery process. This resulted in a failure on their part to consider, before the planning process started, how clinical processes could be redesigned to take advantage of the new facilities. In one example it was felt that the resulting buildings were therefore built for current – rather than future – working practices.

Disrupted communications were also present during the *project execution phase*, leading to misunderstandings and – according to some interviewees – new ideas not being voiced and discussed. As one healthcare architect said,

‘The delivery process was very confrontational with a lot of screaming and shouting. If we could have talked with the contractor more, the project would have been better.’

The project director for this trust felt that:

‘the trust was not seen as the client but rather as an impediment. The SPV was not good in controlling the contractor. Relationships among all parties were quite aggressive because of the underlying investment vehicle and the tight construction budget and timeframe.’

The combination of contractual arrangements and the position of the SPV between the operational system – the clinical end-users of the hospital – and the project system therefore hindered communication and collaboration. As a result the input of operational data, essential for planning for future adaptability, into the project design phase appears to have been restricted.

5.2 Contracts, risk and incentives

We argued above that in order to stimulate innovation, each party assuming project risk should share in any benefits that arise from innovation. Under PFI it was felt to be more difficult to achieve agreement on the introduction of new ideas because of a separation in responsibilities between the project consortium and clinical operations. Whereas the main goal for the NHS was a facility delivering excellent healthcare to its patients, for

the private sector partners a hospital project was mainly seen as an investment vehicle. This mismatch in incentives resulted in more cautious attitudes towards risk, especially when associated with innovative solutions.

Reflecting the government's goal of using PFI to inject design and construction innovation into hospital procurement, the technical services manager for one SPV argued that 'innovation' could be seen as an important sales factor in securing projects. An architect on another scheme felt that offering adaptability in design could help consortia win bids. However, we found a tension between the potential for promoting innovation at the bid stage and the risk averse attitude that prevailed within PFI consortia. Risk aversity was a result of three factors – the competitive bidding environment, a desire by PFI funders to protect their investment in the long term and trusts' desire to transfer risk to the private sector.

First, bidders were asked to design to a given brief, often containing statements about the need for adaptability but without detailed specifications regarding adaptability. In two of the case studies, consortia bidding against each other for a project were therefore unwilling to offer more than the minimum necessary for a successful bid. There was a feeling that since design is carried out concurrently with the tendering phase – when collaboration and open discussion of new ideas is restricted – opportunities for innovation under PFI were very limited. As one contractor observed, 'innovation would need to start during the bidding process... After financial close it is too late'. In this example the director of design for the architects therefore felt that that the PFI process restricted the flow of ideas at the bid stage because 'there is always a fear from the consortium that it might lose the project in the bidding phase'.

Second, pressure to use 'tried and tested' methods was exerted by the PFI funders to protect their return on investment. The long-term contractual arrangements and severe penalties for any non-availability of hospital facilities therefore tended to drive the private sector partners to reduce their risk by using conventional design and construction solutions. One interviewee, an SPV project director, summarised the position thus: 'PFI stifles innovative solutions. Investors and financiers are not interested in innovation; they do not want to take risk'.

Third, on the hospital trust side there was an emphasis on the transfer of risk to the private sector and a consequent reluctance to approve any solutions which were untested or required derogation from current guidance (the official ‘health building notes’ and ‘health technical memoranda’). This tends to be highly prescriptive and does not provide much scope for creative solutions. According to one interviewee this ‘suffocated the product’, citing their inability to introduce an innovative, flexible oxygen tubing system – which offered advantages in installation and use – into their project. In this case the trust argued that the proposed system did not comply with the relevant guidance documents, dating from 1956. Another problem is that output specifications built into PFI contracts focus mainly on technical objectives with measurable targets (e.g. wind loads, flame spread, slip resistance, sound transmission) and do not include any detailed requirement for infrastructure adaptability.

As well as pressures mitigating against innovation which arise from the competitive and financial context for PFI, the different background and business objectives of the stakeholders involved in a typical project can be problematic – incentives towards innovation are poorly aligned and the risks and rewards from innovation are unevenly distributed, making it difficult to take any untested, new ideas forward. This misalignment is manifested both in the SPV / hospital trust relationship and internally within the SPV itself.

The SPV is obliged to its financiers’ interests and not to the clinical operations of the trust. This means that it has no direct interest in adaptability or innovation that would promote future clinical efficiency. The focus for the SPV and its financiers is firmly on initial capital cost, and it was argued that additional spending could not be justified unless the investment could be directly recouped. As one hospital trust project director put it, ‘the SPV (has) no incentive to implement any innovative ideas, unless it increase(s) their profit’. In fact there is a disincentive for the SPV to introduce adaptability, partly because the rewards would only benefit the trust but also because additional income could be achieved through making alterations to the building in the future.

Misalignment of goals was also a feature of relationships within the SPV itself. It was reported by an SPV finance and contracts manager that:

‘there is always a fight between the contractor and the SPV because of the differing agendas they have. The contractor completes the job and is basically done with it, whereas the SPV is responsible for the facility for the next thirty five years.’

Since the companies responsible for construction and facilities management were usually different, and only the latter has to bear the cost of future maintenance, innovative solutions to reduce future maintenance costs but with a higher initial cost for the contractor were not implemented. However, interviewees indicated that this attitude is now changing – partners within PFI consortia are learning to coordinate their activities and incorporate incentive mechanisms in their internal agreements that allow the lifecycle costs of the facility to be taken into account.

5.3 Inter-project learning

Learning from project to project is a necessary foundation for the effective development of new innovative ideas. Since PFI hospital projects generally involve large one-off undertakings, learning from project to project is potentially weakened.

All *private sector* partners reported that they used various strategies to capture lessons following the completion of PFI schemes. These included project reviews, feedback sessions and close-down workshops. They had also created databases of lifecycle maintenance costs and intranet tools to capture information about best practice. Together these were seen as an aid to ‘the learning process for future hospital projects’, as one contractor’s design and construction manager said. However, the competitive environment ensures that although some experiences are shared within in the PFI consortium lessons learnt are typically only captured within the individual firm.

Knowledge gained by *hospital trusts* from experiences on PFI projects is often not systematically captured since they generally execute only one PFI project. In only one case was a detailed post-project evaluation executed, which was published over the internet. Moreover, according to the healthcare director for one architect, the transfer of knowledge between individual trusts is very limited, with knowledge gained on PFI

schemes residing largely within the consortia and architects or individuals within trusts. Because of this, according to the healthcare director of one architect,

‘the old problems of inexperienced trusts still exist, despite the available information, and trusts are no more able to articulate their needs and compile an adequate brief.’

5.4 The role of other factors in hindering innovation

The PFI model is not the sole reason why innovation was impeded in the case study projects; two further areas need to be highlighted. First, the affordability of schemes was of paramount importance to hospital trusts. The need to reduce costs to match the approved affordability limits established by the Public Sector Comparator (PSC) was often cited as reason for low levels of innovation. Under the PSC, a trust would develop an outline proposal demonstrating its needs. This was submitted for approval by the Department of Health. On several occasions, interviewees mentioned that the PSC costings were unrealistically optimistic with very low estimates of required budgets. This in turn was responsible for a low level of innovation or future proofing during project planning phases. Although not explored in our case studies, the Payment by Result (PbR) mechanism, by which hospitals generate revenue according to numbers of patients they treat, further increases affordability constraints. This is because the current PbR mechanism does not allow for the high availability charges incurred through PFI projects. Typically because of these affordability issues, measures for future adaptability could not be included and further development of the hospital would only be possible on a piecemeal basis. In one example, affordability limits did not allow for increased structural loads to provide future vertical expansion potential.

Second, cultural differences between the private and public sectors were also felt to be significant. This was expressed by interviewees from SPVs in terms of a ‘public sector mentality’ that did not allow representatives from the trust to ‘think outside the box’. According to a manager from a contractor, ‘(we) need a committee and a signature for everything, even the smallest thing. This is design by committee’. However, another problem was the need for hospital trusts to respond to immediate operational or policy requirements, and their short term time horizons. Reorganisation of the NHS was felt to be ‘stifling the focus on the future even further’. This was described by the director of

nursing of one trust thus: ‘The (SPV) would like five years’ advanced noticed (of requirements), but this is not NHS culture. It is short-term, fulfilling today’s needs’.

6. Discussion

The PFI model for hospital procurement and operation represents an example of government attempting to stimulate innovation by influencing public demand characteristics. In this section we discuss how successful this has been and how the PFI model compares with previous forms of procurement in this sector.

The structure of the NHS changed significantly with the establishment of semi-autonomous hospital trusts and the introduction of the PFI. Previously the approach was analogous to that of the highly integrated railway monopoly described in Geyer and Davies (2000). Fifteen Regional Hospital Boards (RHBs) were responsible for healthcare provision in their catchment area. Consisting of multidisciplinary teams drawn from clinical, health management and engineering and construction professions, RHBs were also responsible for hospital development initiated by individual hospital management committees (see figure 1). Their coordinating role for centrally funded hospital projects was supported by research and guidance conducted in the Hospital Planning Unit (HPU) of the Department of Health. In addition to the expertise provided by the Department of Health, specialist training and research was provided by the Medical Architecture Research Unit (Rawlinson, 1985). Under this model, innovative solutions to the pressures arising from changes in healthcare needs were partly driven by the HPU and mediated by individual hospital management committees (Francis et al 1999).

In addition, RHBs collaborated in ‘super regional planning’ with their neighbours, resulting in effective service delivery with efficient resource allocation (Moss, 1977). The high level of integration and communication among the multidisciplinary staff of the RHBs and their close ties to the individual hospitals within their region not only allowed an in-depth understanding of healthcare needs and related infrastructure requirements but also close collaboration between infrastructure planners and infrastructure users. This resulted in forward-looking solutions such as Northwick Park

Hospital, designed to accommodate future changes easily without disruption to clinical operations (Weeks, 1980). Furthermore feedback and learning from one project to the next was maximised.

Figure 1 (Previous project-operational system in hospital development) about here

Following the introduction of the PFI model, hospitals were procured individually and a degree of competition amongst hospital trusts was introduced. Central/regional planning bodies were dissolved and only partially transferred to the arms-length agency of NHS Estates (Francis et al., 1999). Although NHS Estates continued to provide guidance for hospital development, the hospital planning capabilities of the past have not been replaced. As a result of these changes, the relationship between the organisational network responsible for the project and the hospital operators was radically altered. Under the PFI model, the network of suppliers, some of which form the PFI consortium itself, is not only responsible for the construction project itself but also the delivery of future facilities management and often other non-clinical services for the duration of the contract. There is, however, a strict separation between infrastructure provision and clinical services delivery, which remains the responsibility of the NHS (figure 2).

Figure 2 (Current project-operational system in hospital development) about here

We suggest that the missing link between infrastructure provision (project execution) and care delivery (service operation) within the PFI process has impeded innovative solutions for accommodating future changing healthcare needs through adaptable hospital infrastructure. This has occurred in two significant ways.

The first relates to the way risk is borne within the project and operational system. The research confirmed that the inefficient allocation of risks hindered innovation. In order to minimise project risks the PFI is designed to ensure as much certainty as early as possible in the procurement, design and construction process. Since the private sector consortium responsible for the scheme bears the majority of project risk, NHS hospital

trusts have to specify their requirements very precisely and well in advance in order to eliminate as much uncertainty as possible. Because of this there is only limited scope for agreeing solutions that are appropriate for facilitating future flexibility. Highly specific design and specification requirements of commissioning authorities have therefore constrained innovation in hospital design and construction (cf. Zitron, 2004).

Second, innovation has been impeded by the increased complexity in the interfaces between the various components of the hospital project-operational system. The case studies found that PFI had not led to more collaborative ways of working, nor did the SPV act as a form of systems integrator. Indeed, the SPV resulted in a strict separation between the project delivery and clinical operational sides, hindering communications and inserting another administrative layer between the design capability (the architect) and the end users of the building (the NHS). Furthermore, although this was not investigated in detail, the case studies suggested that the tendency of consortia and trusts to execute single PFI projects, and the weak input of information from clinical operations into the project supply, limits inter-project learning and the future application of any innovation that does occur within projects.

The framework developed by Geyer and Davies (2000) proved useful in helping to illuminate the dynamic relationship between project delivery and operational system. It demonstrated that innovation processes within complex PFI projects cannot be examined without considering the operational context in which they are situated. A limitation in applying the framework within this context is the difficulty in defining the boundaries of the operational system. In our work, we sought insight from individual projects, which are situated within an individual hospital trust and its operations. This constituted the boundary for our operational system. However, in further research a higher level perspective could be adopted and the operational system could include the regional or even national healthcare system. Further research is also needed to apply the framework to different types of funding and procurement models prevalent within UK healthcare infrastructure provision² or across different national health systems, so that more generalisable insights into the implications of delivery methods for innovative healthcare infrastructure can be developed.

² For example LIFT, another form of PPP in use in the UK for healthcare infrastructure, where there are different incentives for innovation and potentially more stability between consortia.

7. Conclusions

Edler and Georghiou (2007) argue that there is a need to place ‘public demand’ more centrally within innovation policy and use it to complement supply side measures. We have explored the reality of a public procurement model that is currently targeted at the delivery of hospital infrastructure. We found that in its current form, PFI may have been less effective in stimulating design innovation than the model it replaced, which involved greater coordination across individual project and operational systems, and across geographical boundaries. Increasing the role of the private sector in the delivery of public infrastructure projects has therefore not provided the innovation benefits desired by the UK government.

This is not to suggest that PFI or other variants are incapable of delivering innovation. It should be noted that the selected case studies were all early examples of PFI hospital schemes. It is possible that later projects have demonstrated learning and improved innovation outcomes. An updated model, ‘smart PFI’, is also currently being introduced, in which the design phase is removed from the PFI tendering process in order to allow greater discussion about alternative solutions. However, the main structural problem – a separation of the project supply side, through the private sector consortium, and operational services delivered through the NHS – remains unresolved. To overcome this, the SPV should incorporate a coordinating and integrating function that furthers the relationship between project supply and clinical operations, rather than restricting it.

We believe that policy makers should not only ‘learn the readiness of industry to deliver innovations’, as suggested by Edler and Georghiou (2007, 959), but they should also incentivise industry to deliver innovation. A public-private delivery model that includes incentive mechanisms for the partners to consider quality and efficiency improvements in the hospital’s *care outcomes* (e.g. length of stay, hospital acquired infection rates) might be far more effective in helping to exploit the innovative potential of the private sector in providing healthcare infrastructure.

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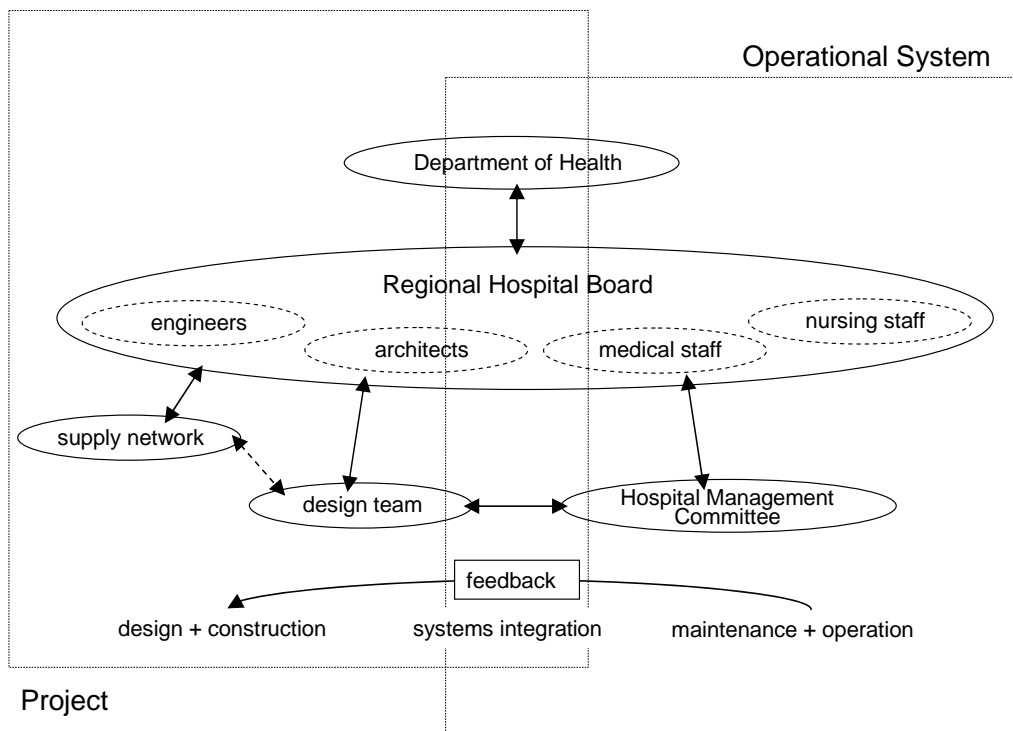
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Table 1. Case study sites

<i>Hospital</i>	<i>Attributes</i>
A	Greenfield site. Early PFI with a repetitive, standardised structure and standardised, multifunctional rooms.
B	Greenfield site. Early PFI, whose matrix design was intended to be internally adaptable, with expansion space on site.
C	Example of a ‘Nucleus’ hospital with a major PFI expansion woven into the existing structure. Example of adaptive development over 30 years.
D	Existing site. Modular construction approach, partially based on existing foundations.
E	Major extension to existing facilities. ‘Doughnut-shaped’ ward layouts to encourage flexible ward management; top floor adjustable for different functions.
F	Urban site. Flexible ward layouts developed for the innovative service delivery model of ‘graduated care’



Project-operational system in the past

Figure 1. Previous project-operational system in hospital development.

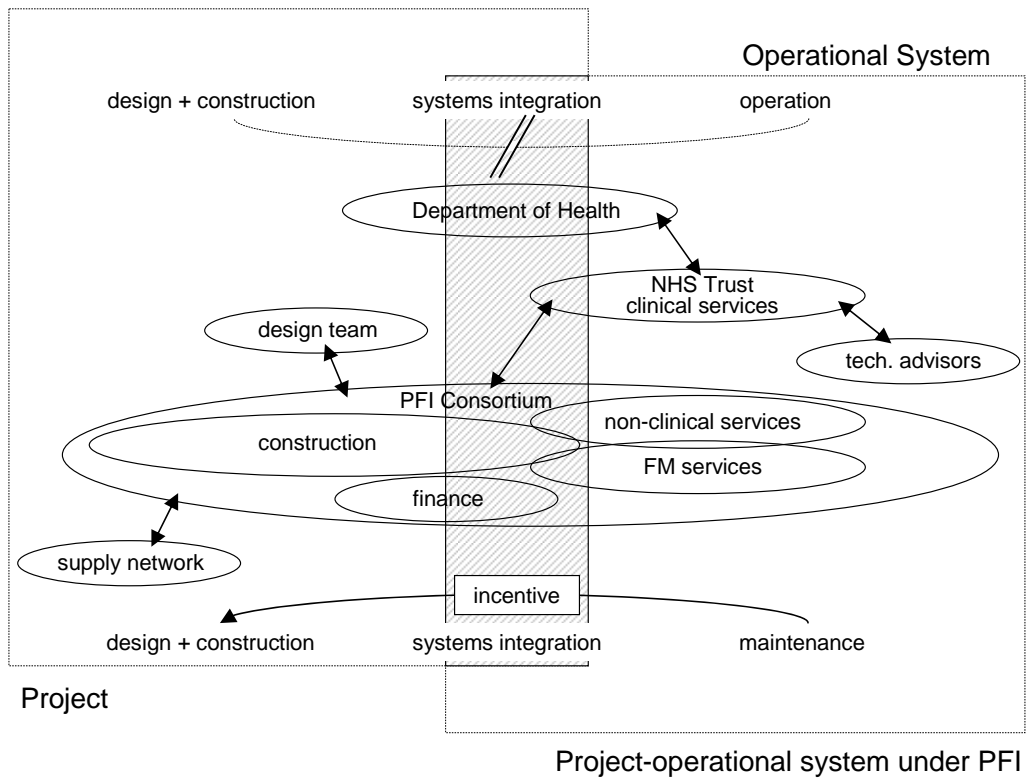


Figure 2. Current project-operational system in hospital development