UK BUILDING PROCUREMENT SYSTEM AND SUSTAINABILITY

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Under the pressure for sustainable construction, research and development into sustainability and procurement is emerging. As the bridge between design and construction, the building procurement system, therefore, is critical to delivering sustainability in practice. It is crucial for the successful implementation of sustainability within conventional construction processes. However, there is a lack of research into the link between UK building procurement systems and sustainability. This paper reviews the concepts of sustainable construction and explores the internal relationship between sustainability and building procurement systems. Furthermore, it examines the current building procurement systems in the UK: traditional, design & build, management system and the Private Finance Initiative (PFI), and analyses the relationships between these procurement systems and sustainable construction. It concludes that PFI is the best building procurement solution to deliver sustainability within the UK construction process. PFI provides ‘Value for Money’, which takes into account both whole life costing and quality of the building, as opposed to the lowest initial cost. The nature of the long-term contract created enables the environmental expenses to be viewed as a positive not negative additional investment. Additionally, risk is transferred from the public sector to private sector, forcing contractors to undertake technical innovation and use energy and resource more efficiently.

Keywords: Building Procurement Systems, Sustainability, PFI, UK.

INTRODUCTION

Currently, there are two common presumptions accepted by most clients and suppliers in the construction industry, both in the UK and worldwide. First, a project may be regarded as successful if the building is delivered at the right time, at the appropriate price and quality standards, and provides the client with a high level of satisfaction (Ofori, 1992; Masterman, 1994; Love, et al, 1998). Second, selecting an appropriate procurement system is a key factor in achieving such client satisfaction and project success (Love, et al, 1998; Tookey, et al, 2001). Masterman (1992) highlights that an inappropriate procurement system may lead to cost and time overruns, claims and disputes on projects. However, the UK building procurement systems have undergone fundamental changes since the 1960s, for example, from a traditional separated contract to today’s partnering approach. The development of building procurement systems now faces a new challenge: sustainability (Elliot and Palmer, 1997; Pasquire, 1999; Simmonds and Clark, 1999).
The emerging themes of environmentalism and sustainability, with their huge impact on current practices, were acknowledged by more clients. Sustainability is becoming the central issue across different industries; which it has been suggested that it will become the fourth construction project objective after time, cost and quality (Ofori, 1992). Moreover, the construction industry as a partner for sustainable development, should share the responsibility for protecting and upgrading today’s environment for the benefit of future generations through promoting sustainable construction (CICA, 2002).

On the other hand, sustainability consists of a wide range of substantial topics and is difficult determine in practice. Building procurement systems are seen as the bridge between design and construction (Vanegas and Pearce, 2000), therefore, critical to delivering sustainability in practice. However, there is a lack of research into the link between building procurement systems and sustainability, particularly in the UK (Pasquire, 1997). This paper investigates the relationship between sustainability and building procurement systems based on this context. It examines current UK procurement systems and reviews the concepts of sustainable construction. Further, it discusses issues of sustainability in the building procurement system and analyses how the four major procurement systems (traditional, design and building, management system and PFI) integrate sustainability. Finally, it concludes that PFI is the best building procurement solution to deliver sustainability in the UK.

RESEARCH OBJECTIVE AND METHODOLOGY

This paper is based on a three years PhD research project currently being undertaken at the Manchester Centre for Civil and Construction Engineering, UMIST. It began in October 2002 and is due to be completed in September 2005. The aim of this research project is to investigate the relationship between sustainable construction and PFI projects and to establish the business benefits that would motivate stakeholder to demand more sustainable construction. The methodology is typified as a multi-method research project. It consists of a literature study, a pilot study, which combined interviews and questionnaire, and case study research. This paper is a part of the conclusion section from the literature review. The aim of this paper is to help bridge the gap between UK building procurement systems and sustainability and to provide a theoretical support for the research of PFI and sustainable construction. There are three main objectives of this paper: (a) to develop a deeper understand the relationship between building procurement systems and sustainability; (b) to examine UK building procurement systems and to compare their implementation to the level of sustainability, and (c) to identify the procurement method most suited to the integration of sustainability. A pilot study will follow the literature review, in the form of structured interviews with three or four clients, construction professions and government officers to examine their experience of sustainable construction. An interview pro-forma will be used to achieve the objectives. Further, the main studies will incorporate to be sent to appropriate personnel actually involved in PFI projects, in order to investigate the current level of integration of sustainability in PFI projects. Additionally, a number of currently or recently completed PFI projects will be carefully selecting for case studies. The case studies will concentrate on the economic performance, plus environmental and social benefits derived. Interviews with both clients and suppliers will take place to investigate the level of sustainability. Finally, a model will be
developed to assist stakeholders in evaluating the sustainability criteria within PFI projects at the inception stage of a project and to inform the purchasing decision process.

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Building Procurement Systems in the UK

In the UK, Masterman (1992) defined the “building procurement” system as: The organisational structure adopted by the client for the management of the design and construction of a building project. Masterman (1992) identifies three building procurement systems: separated and cooperative arrangements; integrated arrangement systems and management-oriented procurement system. More recent building procurement systems in the UK, include, for example, the Private Finance Initiative (PFI) and partnering. There is a vast amount of literature describes each procurement approach’s characteristics and methodologies (Cox and Townsend, 1998), they can be summarised as follow:

- Separated and co-operative procurement System
  The unique characteristic of this category of procurement system is the separation of the responsibility for the design of the project from that of its construction. Even where variants of the basic system allow co-operation between the contractor and the client or his consultants, these two fundamental elements remains as two separate entities. The category contains one main procurement system – the conventional method and a number of variants of that method, for examples, negotiation, two-stage selective tendering, continuity contracts, serial contracts and cost-reimbursable contracts (Masterman, 1992).

- Integrated procurement systems
  This category of procurement system incorporates all of those methods of managing the design and construction of a project where these two basic elements are integrated and become the responsibility of one organisation, usually a contractor (Masterman, 1992). The “design and build” procurement system is the main member of this category with variants of that method making up the remainder of the group. The principal variants are the package deal, ‘develop and construct’ and turnkey (Masterman, 1992). In recent times a host of other variants has also emerged, including ‘build-operate-transfer’, ‘design-build-finance-operate’ and so on. These are effectively similar in concept; the difference is in the balance of responsibilities between client and contractor.

- Management-orientated procurement systems
  Management contracting is a popular method of procurement in the construction industry, since it provides the client with a single point of contract for the duration of the project (Hardcastle and Tookey, 1998). These management approaches were developed in response to the limitations of traditional systems on increasingly complex projects. In the management system, all construction work is carried out by sub-contractors, selected and appointed in consultation with the client and his professional advisers (Naoum, 1991). The variants include management contracting, construction management and design and manage.

- Private Finance Initiative
  The Private Finance Initiative (PFI) has existed within UK since 1992. Currently, this initiative forms one of the key elements of the UK government’s strategy to deliver modern, better quality public service and to reduce public investment by
increasing private sector investment. Almost all government departments countrywide have adopted it. PFI is a flexible procurement method, which is suitable for different type of contacts, for example, traditional, design and build, package deal, partnering, etc. Mainly, three broad types of projects can be identified: financial free-standing projects; service sold to public sector and Joint Ventures (PFP, 1995). There are two principles in the PFI procurement system: value for money and risk transfer from public to private sectors. Treasury defines “value for money” as “the optimum combination of whole life cost and quality to meet the user’s requirements” (PFP, 1995).

Partnering
Partnering is a new direction and is increasing seen as an attractive method of procurement (Fellows, 1997) that improves the level of integration between clients and contractors (Crowley and Karim, 1995). The construction Industry Institute’s Partnering Task Force (Hancher, 1989) defined partnering as “a long-term commitment between two or more organisations for the purpose of achieving specific business objectives by maximising the effectiveness of each participant’s resources. The relationship is based on trust, dedication to common goals, and an understanding of each other’s individual expectations and values”. Partnering usually takes two forms: short-term project based partnering and longer term strategic partnering (NAO, 2001).

The Development of UK Building Procurement Systems
The development of UK procurement systems can be identified in four phases. Masterman (1992) explained the first three phases. He outlined that the first phase was in the years 1945 to 1972, when the conventional methods of procurement prevailed; the second was from 1973 to 1980, a period of recession characterized by an increasing use of non-conventional procurement systems; the third phase, from 1981 to early 1990s, which is a time of post-recession recovery and implemented their own procurement system and more generally, although conventional systems still predominated, design and building and management-oriented procurement methods increase their share of the available workload. The fourth phase is from 1992 to present, which started with a new procurement route, the Private Finance Initiative, and promotion a kind of a broad partnering procurement strategy in all public sectors which called Public Private Partnership (PPP). The following chart (figure 1) shows the changes in the level of use of procurement system in the UK. Currently the market shares with three main procurement system: traditional (40.5%), design and building (42.7%) and management system (12.9%). Partnership is a new direction, but still quite small (1.7% in value). Although PFI is not shown in the figure, OGC statistics shows that till up to April 2003, 570 projects have been let as PFI contract at a total capital investment of over £52 billion (http://pfi.ogc.gov.uk/).
Current Problems and Future Trends

The UK building procurement systems have been reviewed by a series of government documents (for example, Latham, 1994; Levene, 1995; Egan, 1998; HM Treasury, 1998; Gershon, 1999 and NAO, 2001). The old argument that every project is unique and should, therefore, be procured as a separate contract, would appear to be the reason for arms-length, one-off relationships. Such arms-length supply relationships, it is argued, is normally only suited to non-strategic, low-value, and infrequent purchases (Cox and Townsend, 1998). Another barrier is the fact that the UK building procurement system is a priced based tendering system, the lowest prices minimised the contractor margin profits and is a major barrier for technical innovation and education. The price based tendering system may not produce value for money in construction (NAO, 2001). A further problem identified today is the inability of the construction industry to manage effectively design information caused by a lack of understanding between the construction and design teams (Gidada and Barter, 1996). Finally, the “win-lose” culture is a significant barrier to achieve equity in the project environment, which wastes human resource and social cost.

There are three main trends in the modern procurement system in the UK: value for money, partnership and integration of design and construction. The UK government required that all public procurement must be based on value for money. The partnership between clients and suppliers increases the construction productivity and long-term benefits for both sectors. Integration of design and construction will reduce waste and defects during the construction stage and can taking account of end user’s needs. Furthermore, NAO (2001) in the new document “Modern Construction” sets 6 key requirements of procuring and managing construction, they are:

1. Contractors should be selected on the basis of achieving long term sustainable value for money not just lowest price.

Figure 1: Changes in the level of use of procurement system in the UK, 1960-2001
(Source from Masterman, 1992 and RICS, 2001)
2. Construction design should not be a separated process but be integrated with the whole construction process so that the design team can take more responsibility for the implications of their design including cost, quality, buildability and the health and safety of those required to construct, maintain and demolish the building.

3. Sufficient time should be given to planning before starting construction.

4. Reliable project management needs to be in place. The characteristics of good management are: comprehensive understanding; detailed knowledge of risks; regular monitoring and effective communication.

5. The performance of construction projects should be measured to assess whether cost, time and quality requirements are being met and to learn and disseminate lessons for future projects, and

6. Contractors should be remunerated in a way that incentives them to deliver good quality construction on time and to budget.

**SUSTAINABLE CONSTRUCTION**

**Concepts of Sustainable Construction**

Sustainability is a holistic concept, whereby, economic, social and environmental factors are balanced (Hydes and Creech, 2000). The term ‘sustainable construction’ was originally proposed to describe the responsibility of the construction industry in attaining ‘sustainability’ (Hill and Bowen, 1997). In 1994, Kibert defined sustainable construction as ‘the creation and responsible management of a health built environment based on resources efficient and ecological principles’. Kibert’s definition can be considered as the inception of sustainable construction. Furthermore, Hill and Bowen (1997) expand the definition to four principles: social, economic, biophysical and technical and build up their environmental management system (EMS). The four principles include:

- Social sustainability highlights improvements in the quality of human life, and human living environment, which include culture, health, education, and intergenerational equity.
- Economic sustainability includes the use of full-cost accounting methods and real-cost pricing to set prices and tariffs for goods and services and achieve more efficient use of resource.
- Biological sustainability includes the motion that sustainable construction needs to protect the natural environment rather than pollute, encourages the use renewable resource and reduce the use of water, energy, materials and land in each stage of a project.
- Technical sustainability requires high performance, durability, quality and mixed use of a building.

In 1998, the International Council for Research and Innovation in Building and Construction (CIB) created a new agenda for sustainable construction entitled ‘Agenda 21 on Sustainable Construction’, where they seek to create a global framework and terminology to facilitate initiative at national and sub-sectoral levels; and outline research and development activities (Ofori, 20000). This agenda highlights the concepts of sustainable construction technologies not only in terms of ‘hard issues’ such as materials, building components, construction technologies and
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energy related design concepts, but also terms of ‘soft issues’ (e.g. social, culture, economic and management issues). Moreover, CIB sets up a sub theme under W092 entitled ‘sustainability and procurement system’.

**Sustainable Construction Policies in the UK**

In the UK, sustainable construction is a critical and emerging issue. The government published a series of policy documents to encourage the construction industry to implement the principles of sustainable construction in current and future projects. The key policy document, Building a Better Quality of Life: a Strategy for more Sustainable Construction, was published in April 2000 (DETR, 2000). This strategy focuses on the important contribution of the construction industry in the UK and presents 10 action plans in order to achieve more sustainable construction. They are:

1. The re-use of built assets
2. Design for minimum waste
3. The aim of lean construction
4. **Minimising energy in construction**
5. Minimising energy in use
6. Aviation of pollute
7. Preserving and enhance bio-diversity
8. The Conservation of water resources
9. The respect of people and their local environment
10. Target setting


**Benefits and Challenges**

Sustainable Construction has more potential benefits for their investors, suppliers and users than traditional construction methods. Sustainable construction can provide a robust and health built environment for occupiers, reduce waste and energy use, protecting the environment and minimises the negative impact to natural system. Moreover, sustainable construction has significant economic benefits, which include whole life cost savings, increased investment return, improved productivity staff recruitment, enhanced goodwill and positive building image, and support of the local economy (Johnson, 2000 and Yates, 2001). However, sustainable construction still faces some challenges, for example, because of the fear of the high risk and increased capital cost, the demand is low. Further, both clients and their consultants lack the knowledge and experience of sustainable construction. There is a lack of market value and limitations derived from the use of life cycle costing (Zhou and Lowe, 2003). These barriers present the challenges of the implementation of sustainable construction from policies to practice.
**SUSTAINABILITY AND PROCUREMENT SYSTEMS**

**Issues between Sustainability and Procurement Systems**

Sustainability in the building procurement system is emerging. Dr. John B. Milliar highlights the need for a flexible, reliable, mixed public/private procurement strategy, if the broader questions concerning the economy and the environment are to be coherently addressed (Pollington, 1999). CIRIA (2001) argues that the key factors in the delivery of sustainable construction are the skill, experience and knowledge of the client and project team; there is a growing body of evidence to show the importance of adopting the appropriate procurement strategy from a sustainability perspective. Even more important is the need to identify and realise the distinct opportunity for delivering sustainable projects that are associated with different procurement routes. Further, the procurement phase bridges the gap between design and construction, in which materials, construction resources and facility components specified by designers are obtained to physically realized the facility (Venegas and Pearce, 2000). From the client’s point of view, if they use an appropriate procurement system, they can easily implement sustainable construction and achieve the project success as well. ‘Buying green only costs less if they get it right’ (OGC, 2002). An appropriate procurement system can also provide the opportunities to innovation and apply sustainable policies. However, there is a gap in the literature between sustainability and building procurement systems. Pasquire (1997) argues that there is little formally structured information about the procedure associated with the inclusion of environmental issues in the construction procurement process.

Pasquire (1999) argues that the issues to be tackled under procurement are two fold. First, there is the appointment of specialist environmental consultants, which will be dictated by the scale and scope of the proposed project. The second issue is the effect the need for environmental services has on the overall construction procurement decision-making process. The main points to be addressed for both issues are:

- What specialist environmental advice is required?
- Who will provide these services? And
- Where will the management responsibility lie?

Pollington (1999) outlines a number of issues relative between sustainability and procurement system, they are: ethical and human rights, higher environmental standards, eco-design principles, life cycle implications and performance specification, understanding clients’ culture values. Will alternative procurement strategies be required to incorporate sustainability issues?

Sterner (2002) examined some Sweden clients’ experiences of green procurement and found that there is a lack of methods to assist client in their assessments in procurement, tender evaluation and in the evaluation of the environmental impact of materials. European Commission (2001) encourages clients to assess tenders on the basis of economically most advantageous tender, balancing price, quality and life cycle costs, for which the quality assessment criteria should include sustainability factors. CICA (2002) argues that environmental requirements should be clearly stated in the bid documents and should not constitute arbitrary elements for interpretation during the award procedure.

“Achieving Sustainability in Construction Procurement” (2000) placed targets on all government departments to achieve: value for money on the basis of whole life costs;
high BREEAM assessments; less waste; energy and water efficiencies that meet at least current best practice for construction type; enhancement of biodiversity; less pollution; better environmental management and improved health and safety on building sites; better working environment and increased productivity; increased engagement with local communities as part of the decision making process; and improved industry performance against Egan targets.

In brief, the sustainable procurement system should be based on value for money, equity, partnership, integration design and construction, and take into account sustainable issues such as energy efficiency, waste management, etc, and to consider end users’ needs more in the design and construction of building, including future needs.

UK Building Procurement Systems and Sustainability
Currently, it is widely felt by many authors in the field that the traditional route to procuring construction is inherently less efficient and more confrontational than the alternatives (Hardcastle and Tookey, 1998). Naoum and Coles (1991) found that traditional procurement was more likely to over-run in terms of cost and time than other routes such as management contracting. Historically the traditional approach to procurement has been prone to extensive confrontation and what has been termed a culture of litigation (Hardcastle and Tookey, 1998). Elliot and Palmer (1997) argue that the two major procurement systems: traditional and design and build, both separate the early stages of project planning from the construction stage. They highlight that “traditional procurement does this to a much greater extent than design and build but from the environmental viewpoint the effect of the separation is the same. That is, any client organisation’s policy may not easily be carried through to the construction stage.” Furthermore, these procurement systems may not provide a margin of profit to contractors; who may submit claim and use of subcontractors and suppliers (NAO, 2001). The management system provides a particular consultant service to the client, but the nature is still based on the characteristic of separation of design and construction, while it will be easier to deliver the client’s environmental policies to the practice, still difficult to take account of whole life considerations of the project.

PFI can offer real scope to promote sustainable construction (CIRIA, 2001). It incorporates whole-life costing, as opposed to lowest initial price, should encourage a more sustainable approach. The transfer of risks such as energy consumption to the private sector may provide an incentive for investment in more efficient energy usage. If environmental requirements prove too expensive or result in inappropriate levels of risk transfer, however, projects may fail the value for money test, or become unaffordable. The critical factor is to ensure that sustainability gains are assessed against value not cost. PFI clients generally specify outputs rather than input. Clients can use this opportunity to specify a required sustainability performance (e.g. energy usage per year) rather than specifying the use of low energy equipment or facades. It is then the contractor’s responsibility to find the most cost-effective way of delivering the performance level demand. Furthermore, the long term and integrated nature of PPP services (particular PFI) contract incentives the contractors to consider the synergies between the design of an asset and its ultimate operating cost (OGC, 2002).
CONCLUSION AND FURTHER RESEARCH

The construction industry plays a significant role in sustainable development (CICA, 2002). Greater consideration of the environmental impact of construction project cannot happen based on goodwill alone; there needs to be the correct policies organisational structures and techniques of assessment in order to achieve it (Elliot and Palmer, 1997). The UK government publish a series of policies to promote sustainable construction; typically, they force the construction industry to provide a sustainable building procurement system to deliver the sustainable construction from policies to practices. The relationship between sustainable construction and procurement is critical, but few authors have discussed it before. These issues involve both economic and social issues, for example, issues relative value for money, social equity, management system and whole life costing. A sustainable procurement system should be based on value for money, equity, partnership, integration design and construction, and take into account sustainable issues such as energy efficiency, waste management and consider the end users more in the design and construction of building, including future needs. However the first question between sustainability and procurement is: how will existing procurement arrangement allow the sustainability to be achieved? (Elliot and Palmer, 1997) Current there are four building procurement system share the main UK construction market: traditional, design and build, management system and PFI. The first three procurement systems have the same characteristics, via price-based tendering system, win-lose culture and fragmented. PFI is more sustainable and flexible, which can use different contracts based on two principles: value for money and risk transfer from public sectors to private sectors. Further more, it integrates whole life costing and partnership between the client and contractors. All of these demonstrate that PFI is the best procurement system to deliver sustainable construction in the UK. Subsequently, further research will investigate the current integration level of sustainable construction in PFI system, and examine how to achieve the best value of sustainable construction in PFI projects.

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