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A TWO EDGED SWORD: INTEGRATING SUSTAINABLE CONSTRUCTION INTO PFI PROJECTS

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ABSTRACT: Recent UK government polices have identified that the construction industry plays a significant role in the evolution of sustainable development. PFI, as the most active public procurement approach, is potentially a good mechanism for delivering sustainable buildings. The benefits of sustainable construction, for example, in terms of long term cost savings, resource and energy efficiency using and productivity improvement will provide more reliable and sustainable profits for both purchaser and suppliers during the whole contract period. However, the fearing of higher capital cost; lack of government policy; lack of client awareness and demand; and finance incentive has worked against PFI projects embracing towards sustainability. This paper, based on an initial survey, analyses both the advantages and disadvantages of integrating sustainable construction into the PFI process. It concludes that most stakeholders understand the concepts of sustainability, but the balance of these advantages is unclear. Further research is required to evaluate the current sustainable construction experiences in the PFI market.

Keywords - Sustainable Construction, Private Finance Initiative (PFI), Building Procurement, Decision Making,

1. INTRODUCTION

The need for sustainable action was highlighted at the recent World Summit on Sustainable Development in Johannesburg, 2002. The construction industry, encompass a wide range of activities, from land use and plan, procurement, design, construction, operation and demolition, which has a huge contribution to every one’s quality of life, and also an impact on our future. However, since the publication of the first key government sustainable construction policy (DTER, 2000), sustainable construction is still a preformed issue in the built environment. According to Bartholomew (2002), sustainability is usually limited to minor actions, isolated flagship projects, or areas where business interests happen to coincide with sustainability. Logan and Mills (2002) also highlight that the implementation of sustainability into the key stages of projects is still not commonplace. Zhou and Lowe (2003a) found that the fear of higher capital cost, lack of client demand, and limitation of life cycle cost are the main barriers to distribute sustainable construction into practice in the UK.

Central Government, agencies and local authorities as the biggest clients of construction industry, not only need to set up the policies, but also should lead this innovation to challenge the industry towards more sustainable construction. The Private Finance Initiative (PFI), as the most active public procurement, is a good mechanism for delivering sustainable construction. Meanwhile, evidence shows that the planner sale of investment in PFI Building projects over the next decade is truly staggering, it is predicted that over £30billion will be spent in the health sector alone (CIEF, 2003). From another point of view, because the nature of the long term PFI contract, the operating cost saving will be important for both the purchaser and the operator. Thus a sustainable strategy is a significant factor to achieve PFI project successfully (Zhou and Lowe, 2003b).
However, sustainable construction is a complex interdisciplinary subject, it is not easy to understand and apply into practice. Furthermore, PFI procurement system is a new modern procurement system; it is composite and still developing. Therefore, because of lack of skill and techniques, sustainable construction might bring some extra risks or capital costs to PFI projects, it is like a two edged sword, must be handling very carefully. Consequently, it is necessary to investigate both the internal and external relationship between sustainable construction and PFI procurement system, and also need to evaluate the advantages and disadvantages of such integration.

This paper, based on this context, introduces the concepts of sustainable construction and highlights its main benefits and barriers, then outline the government’s policies and the current client demand, and the background of PFI procurement system. The main part of this paper depends on the initial survey - a pilot study, which analyses the main issues around sustainability and PFI, and evaluates the advantages and disadvantages of integrating sustainable construction into PFI and concluded that five main drivers for sustainable PFI projects are whole life cost saving, compulsory legislation, client demand and awareness, finance incentives and stakeholders commitment. However, this conclusion is not yet the final result, which should depend on the next stage – main questionnaire survey results.

2. RESEARCH OBJECTIVES AND METHODOLOGY

This paper draws from an on-going doctoral study entitled: “The economic solution: investigate the stakeholders’ business benefits from integrating sustainable construction into PFI projects”. It began from 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 establish the business benefits that would motivate the key stakeholders making decision to demand more sustainable construction. The methodology is typified as a multi-method research project. It consists of a literature study, a pilot study, main questionnaire surveys and case study research. The literature review was taken about one year, which divided into three parts, a) the principles and concepts of sustainable construction, b) PFI procurement systems c) the relationship between procurement system and sustainability. They were completed in September 2003. The second stage: designing of the main questionnaire and the pilot study took 2 month, which is finished in December 2004. The following main questionnaire survey will start from January 2004.

This paper is based on a literature review and the pilot study. According to Naoum (1998), the pilot study provides a trail run for the main questionnaire, which involving testing the wording of the questions, identifying ambiguous questions, testing the technique that used to collect the data, and measuring the effectiveness of the standard invitation to respondents. The aim of this paper is to give a first view of the advantages/disadvantages of integrating sustainable construction into PFI projects. There are four objectives:

(1) To develop a deeper and wider understanding the concepts of sustainable construction
(2) To identify the main characteristics of PFI procurement system and its market potentials for sustainable construction
(3) To analyses the main benefits and obstacles of incorporating sustainable issues into
PFI projects.

(4) To identify the main drivers for motivating sustainable construction into PFI projects

3. SUSTAINABLE CONSTRUCTION

3.1 The 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). Kibert defined sustainable construction in 1994, as “the creation and responsible management of a health built environment based on resources efficient and ecological principles”. In 1997, Hill and Bowen expands the Kibert’s definition into four principles: social, economic, biophysical and technical and they also developed an 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, 2000). Where they design a new paradigm for sustainable construction against the traditional golden triangle (please see figure. 1).

CIB also highlights three common elements in the sustainable construction approach:

- Reducing the use of energy sources and depletion of mineral resources
- Conserving natural areas and bio-diversity
- Maintaining the quality of the built environment and management of healthy indoor environment
3.2 Economic Benefits and Challenges of Sustainable Construction

Sustainable construction has a number of potential benefits, not only the short term cost reduction, but also in terms of whole life cost saving. Further, it reduces natural human resources cost; these benefits are critical and will bring a better value for building, the developers and end users. However, there are some obstacles for motivation sustainable construction. The challenges for sustainable construction include the size and fragmented nature of the sector, the need for awareness rising with respect to developers and clients, the slowness of changes to architecture and engineering curricula and tendering process, a lack of training programs and other capacity-building tools, and a financing system too often preoccupied with short-term consideration (2003). According to Zhou and Lowe (2003a), the perceived benefits and barriers are summarised in the table 1.

<table>
<thead>
<tr>
<th>Economic Benefits of sustainable construction</th>
<th>Barriers of sustainable construction</th>
</tr>
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<tbody>
<tr>
<td>Running cost saving</td>
<td>Increasing capital cost</td>
</tr>
<tr>
<td>Increasing investment return</td>
<td>Bringing higher risk</td>
</tr>
<tr>
<td>Increasing productivity</td>
<td>Lack of awareness and client’s interest</td>
</tr>
<tr>
<td>Using resources efficiently</td>
<td>Non market value</td>
</tr>
<tr>
<td>Good image</td>
<td>Lack of good delivery mechanisms</td>
</tr>
<tr>
<td>Supporting local economy</td>
<td>Lack of skill with green material and technologies</td>
</tr>
<tr>
<td>Increasing tax savings</td>
<td>Lack of client demand</td>
</tr>
<tr>
<td></td>
<td>Lack of financial incentives</td>
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</tbody>
</table>
4. UK GOVERNMENT POLICIES AND CLIENT DEMAND

4.1 Government Policies and Legislation

The first important government policy relative sustainable construction is: *Building a Better Quality of Life: a Strategy for more Sustainable Construction* (DETR, 2000). This strategy focuses on the important contribution of the construction industry in the UK and present 10 action points in order to achieve more sustainable construction. In the following year, Department of Trade and Industry (DTI) published a *report on progress 2001*, which highlighted the need for more information on forthcoming EU directives effecting sustainability and for promotion of the business case for more sustainable construction. The Sustainable Construction Task Group (2002) published *Reputation, Risk & Reward – the business case for more sustainable construction*, which established the relationship between sustainable construction and business, and concluded that senior executives of construction organizations should pay attention to the growing influence of sustainable construction on business.

There are 2 documents are quite important to PFI industry, the first one is entitled “Achieving Sustainability in Construction Procurement” published by Sustainability Action Group of the Government Construction Clients (2000). These document summaries the actions being taking by various government department and agencies and set time plan and target from 2001 to 2003. Secondly, in July 2002, OGC, DTI, ODPM and Defra jointly published guidance on how to incorporate environmental considerations into Public Finance Initiative (PFI) or Public Private Partnership (PPP) Projects (OGC, 2002) Furthermore, revisions to Building Regulations, such as Part L, have also challenged the industry, with the forthcoming European Energy Performance of Buildings Directive bringing more change.

4.2 Client Demands

After 2000, the demand from both central government and local authorities are increasing. For example, Rethinking Construction published a document called ‘well built: sustainable construction action plan for local authorities’. The London Borough of Enfield published a Sustainable Design and Construction Guide in January 2000 to promote good practice among developers, housing associations householders and contractors working in the borough (DETR, 2000). Kingston up Hull City Council builds their own sustainable construction policy in 2002 and Scottish government set their sustainable public policy agenda (Talbot, 2003). From some of central department, the demand for sustainability is high, Ministry of Defense highlights that sustainable development is a key element for Defense Estate and the scale of defense spending on construction means that the agency has a significant part to play in the rapidly developing field. National Health Services (NHS) Estate has set up their own sustainable policy (NHS Estates, 2001); the Higher Education department has a strategy report ‘Sustainable Construction and the HE Sector, 2001’ (Eclipse Research Association, 2001) as well. Furthermore, WWF (2003) has a plan to build one million sustainable housing. All of demand will bring a significant influence to PFI market and require both the purchaser and suppliers to provide the technologies and skills to deliver sustainable construction.
5. PFI PROCUREMENT SYSTEM

5.1 The Context of PFI

The Private Finance Initiative (PFI) is a modern public procurement system. It is established in 1992, and currently is a key element of the UK central government’s strategy to deliver modern, better quality public services and to reduce public investment by increasing private sector investment. The aim of the PFI is therefore to increase the flow of capital projects against a background of restraint on public expenditure by utilising private-sector money and management. PFI represents a fundamental change in the focus of the public sector, away from being a director provider of services to the public and towards becoming a procurer of services and regulator (Kerr, 1998). There are two main principles of PFI: the achievement of value for money for public expenditure, and the transfer to private sector of “genuine risk” (PFP, 1995). Therefore, PFI has another three main characteristics: (ICE, 2003; Audit Commission, 2001)

1. Output specification: whereby the client specifies its requirement as a stream of services rather than the physical asset(s) through which they will be provided. This is also the heart of PFI and should form the basis of payment by the public sector.
2. Whole life asset performance: in which the private sector will be responsible for the asset it provides throughout its life cycle.
3. Performance related rewards: in which the private sector partner is incentive in the contract to achieve certain desirable levels of performance.

The structure of PFI has been designed to encourage an integrated approach to design, construction, financing and operation of buildings so that issues relating to maintain ability, durability and operability are addressed at the outset of project. Services delivery methodologies should minimize disruption to users during the contract and reduce the cost of services delivery. In addition, a whole life approach can overcome the constraints imposed on the public sector with regard to year on year budgeting (McDowall, 2001).

Up to April 2003, 570 projects have been let as PFI contracts amounting to a total capital investment of over £52 billion. PFI contracts have been used by almost every central government department and local authority. They include most types of public infrastructure: for instance, roads, prisons, hospitals, schools, social housing, and office buildings, etc. Details of these projects can be found at the OGC PFI homepage http://pfi.ogc.gov.uk/. The initiative has been applied to project of varying size and complexity ranging from £1m capital building car park schemes to £70m acute hospital and beyond (McDowall, 2001).

5.2 PFI and Sustainability

PFI contract has natural partnership with sustainability. 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). However, according to Horsley et al’s (2003) recent research, some common characteristics of many PFI, which may constrain building energy performance, the first barrier is the payment mechanism, which offset any increase in capital cost. Secondly, the risk transfer system force the private sector using the safest constructing and operating process, rejects many innovation opportunities.

6. EMPIRICAL WORK AND ANALYSIS

6.1 The Pilot Study

An initial 12 interviews with construction industry professional have been conducted, mainly with a range of stakeholders: clients, designer, engineer, quantity surveyor and consultants (please see table 2). These interviews were semi-structured and based around a questionnaire – which consisting of list topics separated in two sections: sustainable construction and sustainability and PFI. In addition the research has attended four industry workshops on sustainable construction and PFI and examined individual organization’s policies (please see table 3). In this section we will analysis the results and summarise the findings.

<table>
<thead>
<tr>
<th>Organization Type</th>
<th>Professional Background</th>
</tr>
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<tbody>
<tr>
<td>Government Department</td>
<td>Logistics</td>
</tr>
<tr>
<td>Research Institution</td>
<td>Engineer (PFI consultant)</td>
</tr>
<tr>
<td>University</td>
<td>Architect (Academics)</td>
</tr>
<tr>
<td>Building Engineering Consulting Company</td>
<td>Engineer</td>
</tr>
<tr>
<td>Hospital</td>
<td>Academics</td>
</tr>
<tr>
<td>Government Department</td>
<td>Building Surveyor</td>
</tr>
<tr>
<td>University</td>
<td>Engineer (Academics)</td>
</tr>
<tr>
<td>Construction Consulting Company</td>
<td>Engineer</td>
</tr>
<tr>
<td>University</td>
<td>Academics</td>
</tr>
<tr>
<td>Hospital</td>
<td>Project Director (Architect)</td>
</tr>
<tr>
<td>Consulting Company</td>
<td>Quantity Surveyor</td>
</tr>
<tr>
<td>Consulting Company</td>
<td>Policy planner</td>
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</table>
### 6.2 Research Findings and Analysis

- **PFI procurement system and risks**
  
  In this initial survey, total participants agree or strong agree that it is important to integrate sustainable construction into PFI projects. Also there are 7 people strong agreed that PFI is a good mechanism for delivering sustainable construction, and all of them agreed that sustainable construction can add value to PFI projects. The massive increasing PFI market and long term contract period provide a huge capacity for sustainable construction. The high integration level of design, construction and operation in the PFI project can take considering of the whole life cycle of the project, which is a main characteristic of sustainable construction. Sustainable construction is a process, but not a product, which should be running for the whole process. Furthermore, this survey found that the risk of sustainable construction is not clear, 5 interviewees strongly agree or agree sustainable construction will bring extra risks, for example, new materials, techniques, and lack of experience. However, others thought that the challenge of sustainability is mainly on the knowledge and how people solved it out. Sustainability should be one of the criteria in the assessment process when considering bids for PFI schemes.

  “Sustainable development and PFI has a natural partnership” “PFI has too many targets, sustainability is not the important one” “Sustainability is not the main objective of PFI projects” “Sustainability should be built-in rather than bolt-on”, “Sustainable construction involves the whole process but not like a firefighting” “PFI should be motivate sustainable construction”

- **Capital cost and Whole life cost saving**
  
  Capital cost is still the biggest obstacle for sustainable construction in the UK, not only the extra expenses of the new materials and technologies, also the evaluation fees and consultants fees for particular experts, which all are the barrier towards sustainable construction, for examples, one client claims that the BREEAM is quite expensive, and there are 75% interviewees (9 of 12) agree or strong agree that sustainable construction will increase the capital costs of PFI projects. They all want to achieve the sustainability as low as cost. Therefore, 7 interviewees agreed that whole life costing is commonly used in the PFI projects, they accept that sustainable construction can make long term saving or reduce the running/operating cost, and also know that whole life cost is the core to achieve Value for Money. More than half agreed that whole life costing is the key performance benchmarking of sustainability in PFI projects, but it is
not the only one, it is still needed to take account into the three bottom lines: social, economic and environmental issues. However, there is few evidences to proof their beliefs, for example, energy saving, water saving, etc. Another opinion is that whole life costing is “just starting in PFI market, which is not commonly used.” When more people used it, more people will realize and gain long-term value from whole life costing. Sustainable construction may be or may not increase the capital cost, which is depends on the different individual case, the main point is that if the client is beyond the cost consideration, if they have strong environmental agenda, then it will achieve sustainable PFI projects.

“What capital cost would be increased and no major whole life cost reduction”, “Sustainability is not just to spend money to save the earth”, “sustainable construction need to cost as low as possible”, “it doesn’t matter cost more in the capital cost, the important thing is to reduce running costs.” “...The main driver is to reduce running cost, which will result in satisfied client/end users to motivate other clients towards sustainable projects, design and construction.” “WLC should be used in PFI projects”

- Government policy and regulations
The highest echo of this pilot study is that almost all of interviewees or events’ presenters suggested that government need to provide more details policies, not only the whole industry strategy, it is emerging to set up all the action plan particular for PFI markets. Each central government, agency or local authorities need to have their own suitable policies and need to incorporating sustainable construction into the urban or regeneration action plan.

“A need to change in contract arrangement/legislation” “The only way to deliver sustainability is through legislation (such as the Part L Building Regulations and EEC Directive 2002/91)” “Sustainable Construction must be compulsory”

- Client interests, awareness and demand
Research finding that client is the key decision maker of the PFI projects; they are powerful to effect the decision towards more sustainable construction. From the client point of view, sustainability is rising to integrate to the department strategy, they have particular interests in the environmental issues, energy saving and sustainable development. Many clients understood the environmental issues well, and take stepping progresses to work for it. However, they were lack of the knowledge of sustainable construction, (for example, what it is, how is the process, what is different with traditional process) even the whole life value of sustainable construction. One reason causes that sustainability is too difficult to understand. On the other hand, PFI project has too many target at the same time, client’s main consideration will to complete the project more as just in time, cost under budget, but not the environmental issues. The client demand is still low.

“PFI – client led, if client doesn’t specify, sustainable technique can be difficult”, “Sustainability has too much details, not easy to understand” “Client need tell bidder what they want, and how they will be assessed”, “lots information in there (sustainable construction), too much in terms, but not enough people know” “key stakeholders need to increase the awareness” “Client is interest in it, but lack of knowledge”

- Financial incentive and payment mechanism
Lack of financial incentive is emerging to motivate sustainable construction. The higher risk and interest rate of private finance force the main contractor to complete the project quicker rather than to consider long-term benefits. Even though less than half interview agreed that sustainable construction will bring extra risks for PFI
procedures, the contracts still prefer to use the conventional process to make sure that the risks were as low as possible or transfer well. The interests of sustainable construction from bankers and insurance company should be question mark. Because of the limits of research time and funding, they were not tested in this pilot study. Further, almost of all the participants were lacks of awareness of the tax savings from sustainable construction.

“The financing structure makes it much more important to complete projects on time and within budget than environmental consideration”, “there is no extra risk for sustainable construction” “lack of financial incentive”

- Stakeholder involvement

The stakeholder involvement is another main driver for this issue, all participants strongly agree or agree that it is necessary to assist PFI stakeholders to apply sustainable constructing into PFI projects. Sustainable construction is a cross issue, its concepts are not easy to understand. Stakeholders will speak different languages, based upon differing understandings of the means of sustainable construction. Another problem is too many indicators. Because designer, architects and contractors cannot always influence design decisions, sustainability criteria need to be integrated into procurement, contract, and tenders and commissioning. It is necessary to request all stakeholders to work tighter. For the contractors, the experience of sustainable construction will increase their competitive advantages and bring business benefits and sustainable construction method won’t increase the contractor’s workload. End user need attend the early stage to give recommendation for sustainability, however, they won’t involved in the decision making stage. Facility manager is still lagged to join the sustainable team during the procurement stage of PFI projects.

“Sustainability linked to strategic business objectives and earnings growth”, “...need a green team in the project”, “Sustainable Construction need partnerships & supply chain relationship” “Different Stakeholder has different interests in the projects”, “client and contractors need work together towards sustainability”, “all stakeholders need involve in it”, “it is difficult to let end users (staff) to involve, because sustainability is too far to their own job...”

7. CONCLUSIONS AND FURTHER RESEARCH

PFI was once seen as a special procurement process for large-scale investment projects. Recent experience has shown that it is becoming a more accepted option for mainstream procurement. Moreover, all public sector procurement must consider the viability of the PFI option prior to selecting a procurement route (McDowall, 2001). Furthermore, PFI has a natural relationship with sustainability. The long-term period of the contract, whole life performance consideration, partnership between purchasers and operators indicate that PFI is an appropriate mechanism to deliver sustainable construction. However, because of the difficulty in understanding the concepts of sustainability and the complexity of the PFI procurement system, there exist a number of obstacles to achieving sustainability under PFI projects, for example the fear of higher capital cost, lack of government policies and the lack of client awareness and demand, financial incentives and stakeholder involvement.

This paper is based on the analysis of the results of a pilot study, which presents the initial industrial views of incorporating sustainable construction into PFI projects. It is based on a limited number of individual’s personal opinions, however, it does not included which lack of some opinions from some key stakeholders, for example, local
authorities, banker, insurance companies, etc. These results will be tested in the follow-up main questionnaire survey, which is ongoing and will end in February 2004.

8. ACKNOWLEDGEMENTS

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