Procurement Methods And Contractual Provisions For Sustainability In Construction

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Abstract
The construction process has major environmental impacts and its product relates to, interacts with, and adversely affects, the environment for several years. Various approaches have been proposed to help the industry to contribute to the general effort towards achieving sustainable development. These usually concentrate on the contractor’s role, and the construction stage.

This paper considers the possibility of using the procurement approach, and contract provisions to achieve sustainability in construction in Singapore. It discusses the procurement arrangements which are utilised on construction projects in Singapore, as well as the relevant provisions of the two main standard forms of construction contract in use in Singapore. The paper considers areas where the procurement methods and contract forms could be modified to make them able to facilitate the adoption of sustainable construction operations, materials and equipment. It concludes that, as the awareness of potential end-purchasers and users of constructed items in Singapore of issues relating to sustainability increases, developers will have to adopt sustainable construction policies.

Keywords: Sustainability, client’s role, procurement methods, contractual provisions, Singapore
1 Introduction

1.1 Construction, the Environment and Sustainability
The effect of construction activities on the environment is now well recognised. These include (i) competition for land with other activities such as agriculture; (ii) adverse effect on the plots of land which are developed, and their environs, such as changing their ecological characteristics; (iii) consumption of substantial volumes of physical resources, both renewable and non-renewable; (iv) production of substantial volumes of wastes; (v) consumption of large amounts of energy during the processing of materials, the construction process and in the use of constructed items; (vi) contribution to air pollution from the dust and substances, including some toxic ones, which are released during the production and transportation of materials, and in some construction operations; and (vii) disruption of the lives of the people living in the vicinity of the project through traffic diversions, noise pollution and others.

Following the realisation of the relationship between construction and the environment, the need for construction to strive for sustainability in its activities is also understood. Moreover, the nature of sustainable construction and the ways and means to achieve it are also quite established (see, for example, [5, 6]).

1.2 Pre-eminence of the Construction Client
Construction clients are the prime movers of the work put to the industry. They appoint and pay all the other participants in the projects. Clients have different backgrounds, and dissimilar levels of knowledge of construction. They also have different motivations and interests. These features of the client are reflected in the objectives which they make clear to the project team through the project brief and the resulting production documentation prepared in response to the brief. As clients bear the overall financial risk, all the activities of the other parties involved in the project are, or should be, geared towards attaining the particular objectives of the client. For these reasons, in theory, at least, the client’s key interests should drive the project.

Owing to the pre-eminent position of the client on the construction project, several authors (see below) have suggested that the issues relating to the attainment of sustainable construction can only be successfully addressed if clients show interest in, and commitment to, the concept of sustainability. This paper discusses the potential of using the procurement approach, and in particular, the contractual provisions, to achieve sustainable construction in Singapore.

2 Sustainable Construction in Singapore
Singapore wishes to be a “model Environment City” [7]. It has instituted measures to achieve this. These initiatives include: (i) the publication of a Green Plan; (ii) the introduction of relevant statutes, regulations, codes, incentives, taxes and charges; (iii) the establishment of relevant administrative systems and public education programmes; and (iv) the publication of a document outlining the country’s intentions.

Studies have shown that whereas a few aspects of sustainable construction are clearly discernible in the operations of construction enterprises in Singapore, the concept of sustainability is not yet a major issue to the nation’s construction clients and practitioners [8], [9],[10]. It is not addressed in a systematic or even deliberate manner. The Construction Industry Development Board (CIDB), which manages the continuous improvement of the construction industry in Singapore, and provides the lead on key directions for the industry, has not yet identified sustainable construction as a main consideration, although it realises the importance of environmental issues in construction and has drawn the industry’s attention to them [11].

Several authors in Singapore have suggested that progress in the effort to achieve sustainable construction can only be achieved with clients’ leadership. Ofori (1992, 1993) [1],[8] outlines the nature and scope of activities relating to the attainment of environmental objectives on construction projects, and highlights the pre-eminent position the client must take. In a recent study on the perceptions of construction firms in Singapore on the ISO 14000 environmental management standard, Tan (1997) [10] found that whereas the contractors professed their awareness of issues relating to sustainable construction, they were only taking action where they would otherwise infringe existing statutory regulations or charges such as avoiding the soiling of roads and the illegal dumping of waste. He concluded that the industry would only take action to protect the environment when the client demands it.

3 Potential of Procurement Approach

Sustainable construction or aspects of it may be imposed by legislation, the terms of the construction contract, or the policies of the developer, the designer, the project manager or the contractor. Any construction contract which provides for terms that contravene the legislative obligation would result in the terms being illegal, void and therefore unenforceable. On the other hand, the parties to a construction contract may agree to provide either in the conditions of contract or in the other contract documents, the obligation to achieve sustainable construction or aspects of it. Finally, the developer, the designer, the project manager or the builder can voluntarily adopt a policy to achieve sustainable construction.

3.1 Procurement Options

In the division of the legal responsibility in a construction contract between the developer and the contractor, three generic approaches to the procurement of construction projects may be considered. First, the developer may choose to bear all the responsibility for the design, workmanship, materials, methods of work and site operations. The client exercises maximum influence over the project by playing the role of designer and builder and employing workers to do the physical work. This
arrangement requires the developer to enter into employment contracts with all the workers. This Employment Contracts Arrangement is not practised in Singapore.

In the Employment Contracts Arrangement, the developer has the full responsibility and therefore control of the design, workmanship, materials, methods of work and site operations. Accordingly, if the developer has a strong policy which promotes sustainable construction, this policy is likely to be translated into an actual achievement of sustainable construction. Even if the developer does not have such a policy, sustainable construction or aspects of it can still be achieved if the designer or the project management team engaged by the developer promotes and incorporates sustainable construction in their proposals to the developer.

In the second approach to the procurement of the construction project, the developer retains the design responsibility which includes prescribing for the necessary workmanship and materials, but engages the services of a contractor to do the builder’s works. The contractor’s responsibility would then be for methods of work and site operations. This arrangement is known as the Traditional Approach. This is popularly used in Singapore (as well as in the UK from where the procedure originated) by both the private and the public sectors of the construction industry.

In the Traditional contracts, the developer has control over the design, workmanship and materials. The developer who wants to promote sustainable construction can instruct its designers to incorporate features of sustainable construction in their designs and specifications for workmanship and materials. The developer, however, cannot interfere with the contractor’s control over methods of work and site operations, otherwise the responsibility for any delay or defective works arising from the developer’s instructions to change the method of work or site operations would revert to the developer. Whether the methods of work and site operations would follow the principles of sustainable construction is left to the contractor to decide.

In the third generic form of construction project procurement, the developer does not have any responsibility for design or construction because all the responsibility for the design, workmanship, materials, methods of work and site operations is allocated to the contractor in a Design-and-Build Contract. In recent years, the design-and-build contract has been gaining popularity with the developers in Singapore. It is favoured by the CIDB as a potential contributor to the effort to enhance construction productivity owing to the likelihood that it will result in buildable designs. It has been used on several public-sector projects as, led by the CIDB, the main public clients have declared their commitment to that procurement approach.

In a Design-and-Build arrangement, the developer relinquishes his responsibility and control over the design, workmanship, materials, methods of work and site operations of the project. The developer would instruct the contractor on its requirements and available budget. In response, the contractor produces the end product with everything under its control. Accordingly, the decision as to whether sustainable construction should be pursued is left to the contractor to make.
4 Potential of Contract Forms and Other Documents

The usual contract documents used in a construction project include the standard form of contract containing the articles of agreement and the conditions of contract. In Singapore, there are two standard forms in use. The Singapore Institute of Architects (SIA) Form of Building Contract (SIA Form) is used in the private sector. There are two forms, namely, the Lump Sum Contract form and the Measurement Contract form. They are used for Traditional contracts. The other standard form of contract is the Public Sector Standard Conditions of Contract (PSSCOC) which is used by public-sector clients. It is used for Traditional contracts and, with necessary amendments, for Design-and-Build contracts.

The other common contract documents for a construction project include the drawings, specifications and Bills of Quantities, if applicable. Finally, a construction contract may also include ad hoc documents such as letters setting out the agreements reached during tender interviews or other negotiation sessions.

There are generally two ways in which sustainable construction may be prescribed in a construction contract. Firstly, by using the quality prescription specifications where the known standards in respect of design, workmanship, materials, methods of work and site operations which allow sustainable construction to be achieved may be specified. Secondly, by using the performance prescription specifications where the known states of achievable sustainable construction are specified for compliance in respect of design, workmanship, materials, methods of work and site operations.

The discussion in the rest of this section is on how the contract documents may be used in Traditional contracts to procure sustainable construction since the Employment Contract Arrangement is not used in Singapore and Design-and-Build Contracts place all responsibility for the completion of the project on the contractor. The discussion is based on the assumption that the developer is motivated by a policy to pursue sustainable construction.

The SIA Form and the PSSCOC oblige the contractor to comply with all existing statutes and regulations, including any legislation which supports sustainable construction. Thus, by clause 7(1) of the SIA Form:

The Contractor shall comply with . . . any instrument, rule or order made under any written law applicable or any regulation or bye-law of any Government authority or any statutory undertaker which has any jurisdiction with regard to the Works or with whose systems the same are or will be connected.

The corresponding part of clause 7(1) of the PSSCOC has a similar provision. Examples of such statutory provisions for sustainable construction includes prohibition of the disposal of waste through burning in open fires.
In Singapore, two aspects of design which may be considered to be in support of sustainable construction and which have- found their way to the contract documents, namely, the drawings and the specifications, are buildable design and the use of pre-fabricated components. In both instances, the percentage of wastage in materials and labour should be reduced. Any other design in support of sustainable construction may be introduced into the contract documents in the same way.

Although in the Traditional contracts, the control of the methods of work, temporary works and the site operations rest with the contractor [See clause 2(1) of the SIA Form and clause 4.2 of the PSSCOC Form], it is possible for the architect to instruct the contractor to vary the temporary works or methods of working where this is so desired by the architect or the employer under clause 1(4)(b) of the SIA Form. However, this is not expressly provided under the PSSCOC although clause 2.1(1) provides that the authority of the Superintending Officer shall be that stated in or necessarily to be implied from the Contract.

Therefore, it is possible for the Employer using the SIA Form to oblige the contractor to use temporary works and work methods which produce sustainable construction but the contractor must be compensated according to clause 2(3). The clause provides that:

If any accident, loss, liability, claim or damage subsequently occurs as a result solely of the use of the methods of working or temporary works ordered by a direction or instruction of the Architect under sub-clauses 1(3) and (4) of these Conditions and sub-clause (2) hereof . . . the Employer will indemnify and if appropriate pay compensation to the Contractor in respect of the same, provided that the accident, loss, liability, claim or damage would not have occurred if the Contractor’s preferred or previous methods of working or temporary works had been used, and provided further that the Contractor has complied with the Architect’s direction or instruction with due skill and care.

Another area in which the developer may exercise control to promote sustainable construction is in respect of the plant and equipment used by the contractor to carry out his work. Currently, the standard forms require the contractor to enter into an agreement with the owners of any hired or hire-purchase plant and equipment to assign the benefits of the hire or hire-purchase contracts to the employer before the contractor may bring such plant and equipment for use on the site [See clause 16(4) of the SIA Form and clause 24.4 of the PSSCOC]. This requirement may be extended to oblige the contractor to ensure that all plant and equipment to be brought on to the site would accord with the principles of sustainable construction. This must necessarily be accompanied by a provision to compensate the contractor should this requirement result in a delay to the completion of the works or other losses.

5 Discussion

5.1 The Cost-Benefit Equation
The contractor is unlikely to derive significant direct, short-term commercial benefit from the use of sustainable construction methods of work and site operations on a
particular project since the contractor has to work within the contract sum. Therefore, there is no incentive for him to pursue a policy of sustainable construction after being awarded a contract. Indeed, Tan (1997) [10] observed that the contractors he interviewed were adopting a “wait and see” attitude. No construction company in Singapore has yet followed Hawken’s (1993) [12] advice on the commercial merits of adopting policies of sustainability.

Likewise, the developer may not be motivated to adopt a policy of sustainable construction because he may not derive any direct benefit. Thus, in the medium term, private clients are unlikely to require construction enterprises to adopt sustainable construction practices. However, in Singapore, the procurement policies of public-sector client organisations are likely to make the difference. After large and medium-sized contractors meet the requirement to be ISO 9000 certified by July 1999 before they can undertake public-sector projects, ISO 14000 may be the next milestone which the CIDB and public clients will encourage sizeable construction firms to achieve.

5.2 Other Driving Forces
A possible, more fundamental, driving force of sustainable construction in the private sector in Singapore is the preference and thus, demands, of the potential end-purchaser or user of the completed item. Such persons or organisations may “encourage” the adoption of a policy of sustainable construction by the developer as they express a choice for constructed items built in this way through their approaches to the purchasing of units. However, this would require end-purchasers and users to be knowledgeable about sustainability in general, and sustainable construction in particular. The process of “developing” such a person in Singapore is underway.

In Singapore; a public education campaign is mounted each year (during the Clean and Green Week). In the past three years, emphasis has been put on Green Design during this week of lectures, seminars, exhibitions and public shows. A few pressure groups also pursue the matter of sustainability throughout the year. A Green Labelling scheme has been introduced to inform consumers about products made in a sustainable manner. Moreover, the youth are being made aware of these issues through the educational curriculum. While enlightened purchasers or users (in relation to sustainable construction) will not emerge in significant numbers in Singapore in the medium-term, developers must prepare for the advent of such a person by adopting appropriate policies. In this regard, the procurement approach adopted, and the contractual provisions, offer scope.

Developers may seek to engage only construction firms with demonstrable sustainable construction policies, for example, as in their ISO 14000 certification, or incorporate in their contracts provisions which oblige construction companies to adopt sustainable construction approaches on their projects.

A final driving force is legislation. This will impose obligations on the developer and contractor to pursue sustainable construction policies. In such an event, construction contracts would incorporate provisions aimed at achieving sustainable construction.
6 Conclusion

The issue of sustainability in construction has not yet received significant attention in Singapore. However, owing to the actions of pressure groups and an on-going national public education campaign, the potential end-purchaser and user of constructed items is being made aware of the concept of sustainability. Developers may soon find it commercially necessary to adopt a policy of sustainability. The public client is likely to take the lead by adopting It should be possible for both public and private sector clients to achieve their aims in this connection through the inclusion of appropriate provisions in the forms of contract which they adopt on their projects.

7 References