

# **CONSTRUCTION MANAGEMENT AS A PROCUREMENT METHOD A NEW DIRECTION FOR ASIAN CONTRACTORS**

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## **KEYWORDS**

Procurement method, Construction Management, Asian contractors, AIA Forms of Contract

## **Summary**

Construction Management (CM) has been widely used in the United States and sometimes in Australia. However, it is a relatively new procurement method for Asian countries. The system is based on the arrangement where a client appoints a Construction Manager on a fee basis to manage and co-ordinate the design and construction phases of a project. The Construction Manager becomes a member of the professional team, contracting to manage rather than to build. The client enters into direct contracts with contractors for construction works.

This paper examines the roles of a Construction Manager. It analyses the similarities and differences of approaches in organisation structure, responsibilities of the parties involved and the lines of communication, when compared with the traditional procurement method. Since this system originates from the United States, the American Institute of Architects (AIA) Forms of Contract drawn up specifically for this method are examined, with a view to assessing their adoptability in Asia. A case study of a completed project in Singapore using the CM method is also included in the paper.

## **Introduction**

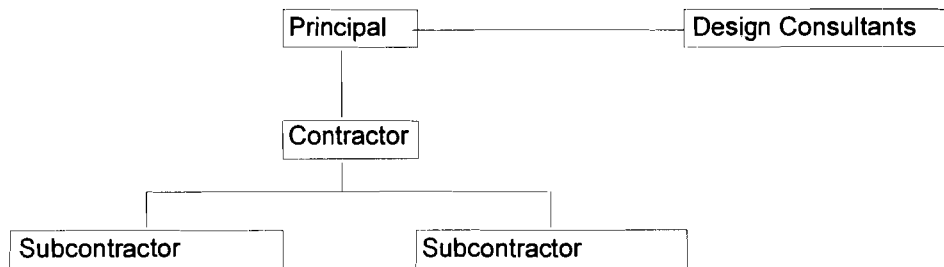
The management of the building process is traditionally undertaken on a client's behalf by the architect who then acts as team leader and coordinates the work of other consultant members of the design team. The contractor is selected on some basis of competition. In terms of timing and responsibility, design is separated from construction.

The traditional method may be characterised as a sequential approach; conception, development and implementation phases are each completed and approved before proceeding to the next (Kwakye, 1990). Figure 1 illustrates the traditional management structure.

The increasing complexity of buildings, the need for a greater degree of financial planning, the need to reduce design and construction periods and the increasing burden of contract administration has brought pressure to find other ways to deliver the project. Many clients are becoming increasingly dissatisfied with the traditional form's operational characteristics and seek other methods of procurement. In recent years, there has been a growing trend towards supporting innovative and novel non-traditional processes of procurement which can realise far greater rewards (Griffith, 1989).

Construction Management (CM) is one such approach, in which the clients appoint an external organisation to manage and co-ordinate the design and construction phases of a project. The CM organisation may provide specified common user and service facilities but does not normally execute any of the permanent works, which are undertaken by construction contractors.

CM has been described as being able to accelerate project duration, improve overall buildability, encompass flexibility and facilitate price competition (Sidwell et al 1987, Hughes 1991). However, its emergence has not been trouble free and its growth has been limited by a number of factors. This paper considers the CM method of building procurement amidst the industry's increasing expectation of innovative and improved methods, identifies potential benefits and problems of application and addresses the likely implications for a building contractor in the Asian context.



**Figure 1 Traditional Management Structure (Waldron, 1993)**

### **Definitions of CM**

Providing a single definition of CM is difficult, as there are many varying interpretations of the concept. These differences reflect the continual changes that occur worldwide in the construction industry. Bennett and Grice (1990) define CM system as a project delivery method where "the client appoints design and cost consultants and a contractor or consultant to manage construction for a fee. Specialist contractors are appointed to undertake the construction by negotiation or in competition". CIRIA (1983) gives a similar definition, viz: "CM systems are arrangements in which the client appoints an external organisation to manage and coordinate the design and construction phases of a project. The CM organisation may provide specified common user and service facilities but does not normally execute any of the permanent works, which are undertaken by construction contractors".

There are two basic forms of CM. In *Agency CM*, the management role is taken by an individual or organisation acting on behalf of the Employer, purely as an agent. This agent can be practising as a contractor or a professional consultant. Trade contracts (or Works Contracts) are made directly with an Employer. In *Direct CM* (also called Management Contracting in the U.K.), the management role is provided by a general contractor, who enters into trade contracts for construction works.

### **Development of CM**

There tends to be disagreement as to when CM was first used, largely due to the many variations of CM used worldwide. Lammers (1970) claims that owner-builders have been providing essentially a CM service since the early 1900's, as architects and consultants have been employed in the same building organisation. Alternatively Scott (1986) highlights the World Trade Centre (1966) in the USA as the first usage. Sidwell et al took a random sample of offices and hotel projects in the US in 1986 and found that 80% of these private sector projects were being organised on the basis of CM (Sidwell 1987).

In the UK arena, Sidwell (1983) suggests that the Horizon Factory in Nottingham (1969) as the first usage of this procurement method. A recent RICS survey (1993) indicates that CM has been used increasing in the UK, with contract value percentages rising from 6.89 to 19.36 in 1989 and 1991 respectively. The system had also been spread to Australia, with the New Parliament House being a typical example.

The motivation behind the search for an alternative procurement method is generally believed to have come from building clients, who were dissatisfied with the cost, time and quality performance levels obtained when using traditional contracting. The lump-sum method displayed inadequacies when placed under pressures of modern day construction techniques. Construction clients decided that alternative procurement methods were required to improve the viability of undertaking a new project, CM being one of the several possibilities.

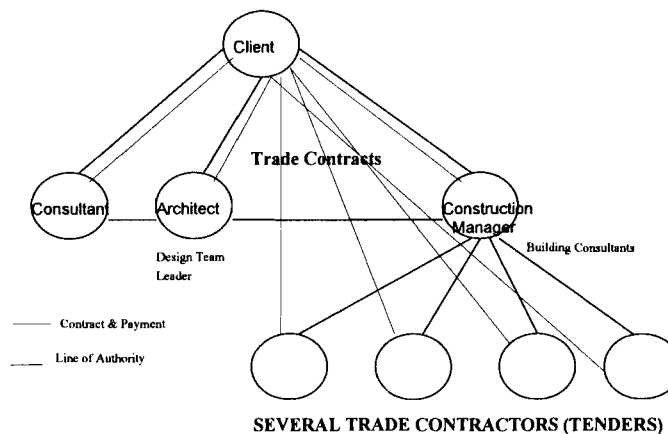
## **Features of CM**

### **Organisational structure**

The use of CM results in significant alterations to the contractual arrangements between the project team members.

The most obvious difference between the CM system and the traditional building contracts is the altered contract between the client and the main contractor. In traditional contracting the builder is invited to tender for construction work. This involves estimating the building costs, according to the requirements of the supplied tender documents and specifications and then submitting a firm price that includes construction costs, builder's overheads and a profit margin.

CM provides an alternative in that the contract between the builder and the client consists of a pre-determined fee, ranging from fixed, percentage or a combination of percentage profit plus reimbursable overhead costs. The Construction Manager becomes an employed agent of the client and not an independent business entity. This results in the builder being remunerated in a similar manner to an architect, engineer or other consultant. Professional responsibilities must therefore be assumed, that is, the Construction Manager is legally obligated to work for the betterment of the client, not himself. Figure 2 elaborates this contractual relationship.



**Figure 2 Construction Management:  
Organisation Structure and Contractual Relationship**

*Source: Baulderstone Hornibrook, 1988*

### **Early Appointment of the Construction Manager**

Traditional procurement methods see the main contractor appointed after the design and specification is complete, and after a lengthy tender process has occurred. CM's different contractual arrangement allows the appointment of the Construction Manager at or during the design stage. This results in the following benefits due to the Construction Manager's new role as an information source to the design team.

- Construction Manager's greater knowledge of buildability will result in a more cost efficient design.
- "Hands-on" experience of actual costs, time considerations and construction procedures.
- Identification of items with long lead times early in the project's life.
- Concepts of "Value management" can be applied due to the feedback properties of an integrated project team (Chan, 1993).
- Careful pre-construction planning of building methodology should result in a quicker site start-up period.

The view that the Construction Manager needs to join the project team at the early stages of the design phase to achieve CM's full potential is upheld in most articles relating to CM (CIRIA, 1984) (Collins, 1987) (Curtis et al, 1991) (Masterman, 1992) (Naoum, 1991) (Turner, 1990). The owner's interests are usually best served in this instance because the greatest benefits are realised when the design and construction phases are integrated (Rawlinson, 1984).

### **Fast-track construction**

CM allows the concept of "fast-tracking" to be used on a project due to the early involvement of the Construction Manager (Kwakye, 1991). Figure 3 shows how this might be possible because of the overlapping of planning, design, tender, award and construction.

#### **Traditional Construction Method**

**Appointment: Architect/Engineers/Project Manager**

Schematic Design	Design Development	Documentation	Tender	Construction
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*(Single Construction Contract)*

#### **Construction Management Method**

**Appointment: Architect/Engineers/Construction Manager**

Schematic Design	Design Development	Documentation
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Construction
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*Variable Separate Construction Contract*

*(Tendered competitively as appropriate)*

**Time Saving**

**Figure 3      Program Comparison between Traditional Construction Method  
and Construction Management Method**

This method is opposed to traditional linear project development, where each stage of the project is reliant upon the successful completion of the previous phase. Traditional tendering requires almost completed design when it is sent out to tender. There is also the situation where prices are required for trades such as wall finishes or landscaping, well before work in that particular section commences. Compensating for price and economic changes becomes difficult and frequently results in large risk contingencies being added to tendered prices, or errors being made.

CM sees the use of trade or work packages, where specialist contractors are asked to tender for particular sections of work, much like a builder appoints a subcontractor. Trades such as demolition and substructure footings, which are tendered and usually finalised early in the design process, can be documented, tendered and started while finishing trades are still in the documentation stage. Construction therefore commences at the earliest possible time, with the object being to shorten the overall project time (NEDO, 1985).

### **Project team relationships**

The CM procurement method is also characterised by the altered relationship between the builder, now adopting the role of the Construction Manager, the project team members and the building client. Although CM is now used with greater frequency in the construction industry (Trenordan, 1985), it represents a change to the traditional lines of authority between builder and consultants. The builder is now appointed at an equal rank with other design team

members. The many alterations created by the builder in adopting a professional instead of commercial role has caused CM to be met with scepticism amongst some traditional building professionals.

### **Advantages and Disadvantages of CM**

The selection by a client to use CM must be a careful one. There are both positive and negative factors to be considered, depending on client's requirement, project needs and other contingency variables. The major attributes are outlined below:

#### **Construction cost**

- Final cost is unknown at the initial stage.
- CM firm's fee is generally less than general contractor's profit (Lammers, 1970) (Nahapiet & Nahapiet, 1985).
- Some studies have shown that total construction costs have been reduced (Adrian, 1981), others dispute this (Naoum & Langford, 1991).
- Varying ideas of cost reliability. NCDC (1987) found that cost estimates were more reliable due to progressive adjustments to the scope of the works. This is supported by Naoum and Langford (1991). However the General Services Administration (GSA) in the US experienced substantial cost over-runs (Scott, 1986).

#### **Construction time**

- Nearly all studies concerned with CM have recorded reduced construction time (CIRIA, 1984) (Collins, 1987) (Curtis et al, 1991) (Masterman, 1992) (Naoum, 1991) (Turner, 1990). This was attributed to the use of "fast-tracking" techniques and specialist trade contracts (Kwakye, 1991). It is felt that the time savings are created by overlapping design and construction. The actual time spent on constructing may well be similar to traditional contracting.

#### **Construction quality**

- Little has been researched on this topic but the aim is to maximise or at least maintain the project quality. Indeed, "acceptable if not optimal" levels will be reached (Adrian, 1981).

#### **Project suitability**

- CM is most beneficial when it is used on large, complex projects (Naoum, 1991). However this does not preclude CM from being used on lower cost buildings (Nahapiet & Nahapiet, 1985). Projects like industrial, commercial, schools, universities and hospitals have proved to be successful with this procurement method (Sidwell, 1982).
- Projects that have tight time constraints.

#### **Client suitability**

- Organisations which do not have specialist "in-house" staff; or inexperienced clients (Nahapiet & Nahapiet, 1985).
- Public agencies, with their need for fixed costs, may have difficulty adopting CM, as reflected by GSA (Scott, 1986). Private organisations may not have such tight regulations and may make greater use of CM's flexibilities (Sidwell, 1985).

### **Client's liability**

- Because fast-tracking is used, there is no guaranteed final cost when the project begins. This is the client's greatest risk. Cost over-runs in the later stages of the project are borne by the client (Sidwell, 1985). Because CM firm acts as a professional agent, the client bears responsibility for the poor performances of any trade contractors.

### **Selection of Construction Manager**

- The CM firm must have the suitable staff, resources, skills and experience.
- Need to be able to provide a professional, rather than commercial role.
- They should have "hands-on" experience in construction, to give the necessary cost of buildability information. An understanding of the design process is also imperative.
- For these reasons, firms with a general contracting background are frequently, though not always, a sensible choice for Construction Manager (Lammers, 1970). This opens up a new and challenging role to building contractors.

### **Construction Manager's fee**

- Three main methods are used:
  - *Fixed fee:* best applied when the projects scope and size are well defined. Significant changes in the project should see an appropriate adjustment to the fee. Best chance for a CM firm to supply an unbiased agency role.
  - *Fixed fee plus reimbursable costs:* frequently used method, with the CM firm's overhead costs on site being reimbursed. Due to self interest, however, there is a possibility that high quality site facilities will be used at the client's expense (Sidwell, 1983).
  - *Percentage of cost:* not a preferable choice because it promotes inefficiency and lack of motivation. There is a bonus for increasing costs (Adrian, 1981).

### **The Role of Asian Contractors in CM**

Having cited the pros and cons of the CM procurement approach in general, it is worth considering whether this method, which found favour in the US and the UK, can be equally well received in the Asian construction industry.

Countries in Asia are often differentiated by the labels of "developed countries", "newly industrialised countries (NIC)" and "less developed countries (LDC)" according to the status of their economies and growth rates. The expertise of contractors in these countries differs more or less to the same extent as their labels would imply. Japan, for example, has developed sophisticated construction know-how, which they export. On the other hand, contractors in countries like Cambodia and Myanmar are still using labour-intensive technology.

Given this divergent situation, CM is more likely to find application in developed countries, where general contractors, due to their extensive use of subcontracting, have effectively become managers, rather than traditional builders. In developing countries, clients may be reluctant to adopt the CM approach since the risk of individual works contractor defaulting is high. Yet, the recent construction boom occurring in developing countries due to their infrastructure needs have prompted many international contractors to penetrate into their markets. These contractors usually form joint ventures with local partners. Hence, there is a growing opportunity for local contractors to absorb the technological and managerial know-how from their overseas partners. Therefore, in the not-distant future, these local partners can build up their strength to act as Construction Manager (CMr). However, they still need to market their management skill to clients to alleviate their worry about contracting directly with smaller package contractors.

### **Contracts for Construction Management**

There are several standard forms of contract written specifically for use with CM in the US and Australia. A series of forms being commonly used in the US are published by the American Institute of Architects (AIA). Amongst the series are the Standard Form of Agreement Between Owner and Construction Manager (Form B801) and the General Conditions of Contract for Construction - Construction Management Edition (Form A201/CM). The former document binds the Owner and the CMr, who provides professional management services in parallel to an Architect. The latter document binds the Owner and the Contractor, who undertakes an individual work package. The salient aspects amongst the provisions of the B801 Form are as follows:-

- \* The CMr's duties are divided into Pre-construction Phase and the Construction Phase.
- \* Specific duties are imposed on the CMr to develop construction budgets and a project schedule.
- \* The CMr has the duty to inspect the Contractors' works against defects and deficiencies but no liability falls on the CMr if any Contractor fails to perform the work in accordance with the contract documents.
- \* The CMr is to review the Architect's design during its development when this advice is sought.
- \* The Owner is required to furnish to the CMr reasonable evidence that funds are available to cover the cost of the project.
- \* Delays by the Contractors entitle the CMr to compensation but delay by the CMr in performing his duties is not addressed.

The A201/CM Form resembles the form used in traditional contracting except that the management role of the CMr is addressed in parallel with the Architect. Salient aspects of the CMr's role as provided in the Form include:-

- \* The CMr assembles and reviews all payment applications before recommending to the Architect for certification.
- \* The CMr can approve the individual Contractors' Construction Schedules and co-ordinate them with the Project Construction Schedule.
- \* The CMr can reject non-conforming work, subject to review by the Architect.
- \* The CMr may determine reasonable time extension and recommend to the Architect for Change Order purpose.
- \* The Architect determines values of Change Order, the Date for Substantial Completion, and even termination of Contractor's employment in consultation with the CMr.

It can be seen from the above that the AIA standard forms confer just adequate power to the CMr to exercise control on construction works, whereas the power for approving time, cost and quality issues still vests with the Architect. Basically, these forms of contract can be easily adapted for use in the Asian setting (for example, by amending the specifics of arbitration rules) but it appears that the Architect under these forms is still required to perform some management function, rather than purely devolving on design work, as the definitions of CM would imply.

## **Case Study of a CM Project in Asia - The Indonesian Embassy Complex in Singapore**

### **Description of the Project and its Participants**

This project is for the construction of a complex for the Indonesian Ambassador in Singapore. The works comprised the complex building, swimming pools and a tennis court. The Employer retained a firm called Jaya-Penta as Construction Manager, TSP as Architect and Rider Hunt Levett & Bailey as Quantity Surveyor. Other consultants included an Engineer, Interior Designer and Landscape Architect.

### **Contractual Arrangement**

The Architect was retained for the design, submission of drawings to the authorities and quality control, whereas other contract administration duties rested with the Construction Manager (CMr). The Conditions of Contract were based on the Singapore Institute of Architects (SIA) Form (1979 edition) with revisions to cater for the CM approach. All works were arranged in separate work packages, which were direct contracts with the Employer:-

Packages	Scope of Work
1	Piling and hoarding
2	Site preparation
3	Building carcass
4 to 15	E & M, landscaping, swimming pools and tennis court

The relationship between the parties are depicted in Fig. 4. It can be seen that the Architect was mainly responsible for co-ordinating the design team whereas the Construction Manager was responsible for construction co-ordination.

The salient aspects of contract administration are illustrated in flowcharts. Fig.5 shows the regular reporting system through the CMr, who had resident site staff receiving and checking daily reports and weekly reports. These reports were then passed onto the Architect for approval as the latter was officially responsible for quality control. Monthly reports to the Employer covering design status, financial situation and construction aspects were compiled and distributed by the CMr.

The quantity surveyor prepared bills of approximate quantities for all packages and recommended payments for the work done by remeasurement. Unlike the AIA contract, payment certificates then prepared by the architect had to be approved by the CMr before passing onto the Employer for payment. After that, the CMr monitored the payment status to ensure that the Employer met his contractual obligations. (Fig. 6)

If any change or variation is initiated by any project participant, the proposal had to be vetted by a Project Control Group comprising the Architect, the CMr, the QS and the Employer. After approval by the Employer, the formal Change Order was issued by the CMr. Negotiation of the exact cost involved was then followed up by the QS. (Fig. 7).

In respect of material sample submission, the CMr acted as the co-ordinator to facilitate approvals by the Architect. (Fig. 8).

The CMr also played a key role at the hand-over stage, by carrying out final inspection, testing and commissioning as well as collecting all maintenance manuals and as-built drawings from the package contractors.

One notable exception to the CMr's role in this project is his secondary position in the procurement of package contracts. The QS was primarily responsible for prequalification of tenderers, preparation of tender documentation and evaluation of tenders.

This project saw the requirement for each package contractor to provide performance bond to 100% value of the package contract sum, reducing monthly by the certified value of work executed by the package contractor during the preceeding month. This requirement was inserted presumably to reduce the risk of default of individual package contractor, which Employers face in CM contracts.



The project was completed smoothly with no major claim or dispute.

### **Conclusion**

Construction Management as a procurement method has been widely used in the US, UK and Australia. However, it is a relatively new procurement method in the Asian construction industry. In essence, CM is a contract to manage rather than a contract to build. It is a very versatile procurement system which provides many advantages for the client and the contractor. However like all other procurement methods, it has some limitations which need to be carefully addressed before full benefits can be realised. In the Asian context, this procurement method is more likely to find application in developed countries where the default risk of individual package contractors is comparatively lower. As well-proven standard forms of contract are available, it is a reasonable expectation that Asian contractors will take the CM approach as a new direction for their growth.

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