

## **CONSTRUCTION MANAGEMENT (CM) SERVICES IN INDONESIA**

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### **ABSTRACT**

Construction Management (CM), some named it as Agency Construction Management (ACM), emerged in the construction industry since 1970s. It was legally become one of the construction service by government procurement method since the establishment of Government Regulation no 28 year of 2000, and it was strengthened by the Presidential Decree no 80 year of 2003. CM was recognised by academics, and it was included in the Civil Engineering curriculum, but not well recognised by the society. Even parties involved in the industry had different understandings. This paper presents the general understanding and terms used in Construction Management services. It discusses the CM body of knowledge based on the Construction Management Association of America (CMAA), and Indonesian Society of Construction management Professional (HAMKI). The roles and services provided by CM firm also highlighted, and CM practices in Indonesian construction industry is presented.

**Keywords:** Construction Management, Body of Knowledge, Indonesia.

### **A. INTRODUCTION**

The term Construction Management has different understanding for different people. Some people mean that CM is nothing more than starting a part of construction of a project while the design is being completed. This referred to as phased construction. Other view CM as the implementation of critical path planning and scheduling for a construction project. Yet other interpret to mean the elimination of general contractor by engaging an individual or company to award separate contracts to several contractors to build component parts of a project.

This paper aims at discussing the true definition of CM based on the Construction Management Association of America (CMAA), introducing the CM body of knowledge and the services provided by the CM firm. Finally it present two cases of studies regarding practicing CM in the construction in Indonesia..

### **B. THREE COMMON DELIVERY SYSTEM**

#### **GENERAL CONTRACTING**

The parties involved in a general contracting project are the owner, GC, A/E, trade contractors, and suppliers. The A/E provides design and guidance to the owner. The GC provides contracting and construction services, including the management of construction. The A/E design the project, produces drawings and specification for bidding and construction purposes, and administers the project overall in the owner's behalf.

The GC, an independent contractor, privately develops a proposal for the project's construction cost, uses his own resources to purchase materials, subcontracts work, and constructs work in accordance with the terms of his contract. On buildings, 80 to

100% of the construction is accomplished by subcontractors. Extensive subcontracting postures the general contractor as a manager of subcontractors rather than a constructor.

#### DESIGN- BUILD CONTRACTING

The parties involved in a design- build project are the owner, D-B contractor, trade contractors, and suppliers. The D- B contractor provides all required services under a single contract with the owner. Design services are accomplished by the D-B contractor's own forces or by an A/E firm hired directly by the D-B contractor. Construction services are provided as in the GC system; D-B contractor are sometimes GC contractor functioning in a design- build capacity on a project basis.

#### CM CONTRACTING

The parties involved in a CM project are the owner, A/E, CM, trade contractor, and supplier. The involvement of the A/E and CM can vary on a project basis. The services assignment options in the CM system are numerous, and a variety of contract configurations are produced as a result. This flexibility captured the imagination of the industry and contributed significantly to the popularity of the system. Its versatility facilitates its use. Owners can customize a CM form and variation to suit a specific need. CM has often been referred to simply as Innovative Contracting

### **C. CM DEFINITION**

According to CM the Construction Process, ADRIAN, J.J. (1984) defined that CM (Construction Management) is a process by which a potential project owner engages an agent, referred to as the CM, or Construction Manager, to coordinate and communicate the entire project process, including project feasibility, design, planning, letting, construction, and project implementation, with the objective of minimising the project time and cost, and maintaining the project quality.

HALTENHOFF (1999) provided insight that CM, first and most importantly, a construction manager is not a person. A construction manager is an organization staffed by personnel who collectively possess the management, design, construction, and contracting expertise necessary to credibly execute the CM contracting format.

This does not mean that one person cannot be sufficiently knowledgeable to provide CM services; it simply points out the unalterable fact that one person has neither the time nor the physical capacity to execute the CM format effectively. If the CM only consists of one person, its performance will not be maximal, because CM has so many jobs like he mentioned before. Almost impossible that CM only has one person, especially to handle the big projects, except a person who has background in CM and he wants to build his house, he can handle it by himself.

### **D. THE TWELVE CM BODY OF KNOWLEDGE FROM CMAA**

#### **CM BODY OF KNOWLEDGE**

The twelve CM body of Knowledge based on the CMAA are: Budget Management, Schedule Management, Quality Management, Decision Management, Contract Management, Safety Management, Risk Management, Resource Management,

Material/Equipment Management, Information Management, Project Management and Value management. The following definition and area of knowledge are explained

### **Budget Management**

The budget management area of knowledge encompasses all project related cost aspects of CM practices. The CM has the responsibility to confirm, generate, track, report, and substantiate all budgeted cost from first estimate to final accounting. The conceptual budget for the project, prepared by the construction manager before design begin, becomes the teams line item financial guide as the design process move toward the bidding phase. After bidding, the amount of accepted contractor proposals replaces estimated line-item and become the construction budget. As construction precedes, payments to contractors, contract changes and budget expenses are accounted for in detail. Every aspect of project cost is estimated as early as possible and substantiated as it occurs.

### **Contract Management**

The contract management are of knowledge encompasses the involvement of CM in the operational and administrative provision of the contracts used on the project. CM recommends contract forms and performance responsibilities for participants to be included in contracts.

### **Decision Management**

It compasses the development and handling of interrelationship of the project and construction teams and the relationship of their respective members. This area of knowledge is the least technical, but one of the most important when providing CM services. It is the CM's responsibility to consistently extract decision from the team which are in the best interest of the owner without alienating any team members in the process. Team member must approach decision and make decision co-operatively, respecting each other's project function, expertise, and operational capacity.

### **Information Management**

The information management area of knowledge encompasses the collection, documentation, dissemination, safe keeping, and disposal of verbal and graphic project related information. The team structure and the use of multiple contracts significantly increase the information available to the owner. The volume of information, generated for project accountability purposes and by team member participation in decision- making checks and balances, requires a multilevel. need- to-know reporting structure and an efficient information storage and retrieval system.

### **Material/ Equipment Management**

The material/ equipment area of knowledge encompasses all activities relating to the acquisition of material and equipment from specification to installation and warranty. The CM format facilities direct owner purchase of material and equipment for the project. The advantages (and disadvantages) of direct owner purchases must be

evaluated and decisions on direct purchase items extracted from the team in a timely manner. The planning, specifying, bidding, acquisition, expediting, receiving, handling and storing of direct purchases, must conform to the owner's purchasing policies and accurately reflect the requirements of the project schedule.

### **Project Management**

It encompasses all operations aspects of project delivery, including determination, formulating, developing, installing, co-ordinating, and administering the necessary element from the beginning of the design to determination of warranty and guarantee periods. The CM has the responsibility to make the selected CM progress work to co-ordinate the efforts of the team and the performing contractors in achieving their common goal.

### **Quality Management**

The quality management area of knowledge encompasses all elements of CM project delivery that contribute to the quality of the end product. Quality is stipulated by the client, designed into the project by the A/E, reviewed by the team, and constructed into the project by contractors. During design, quality has varying levels from high to low. Once specified, quality must conform to the levels specified. Quality management is a continuing process originating with client decisions and ending with contractor conformance.

### **Resource Management**

The resource management area of knowledge encompasses the selection, organization, direction and use of all project resources, both human and physical. The CM contracting structure places all consulting, design, management, contracting, construction and construction services in a co-operative or team environment, and focusing team co-ordination activities on the construction manager. Additionally, the CM's own multifaceted resources must be maintained in the flow of the project. These ubiquitous obligations make resource knowledge and resource management essential parts of successful CM performance.

### **Risk Management**

The risk management area of knowledge encompasses the dynamic and static risks that are part of every capital expansion program. Dynamic risks (risks directly tied to team decisions ) and static risks ( risks simply inherent to a construction environment) must be identified, evaluated and disposed of in a manner which will minimize economic loss to the owner in the event a risk with attached liability occurs.

### **Safety Management**

The safety management area of knowledge encompasses safe practices at the constructions site in accordance with the prevailing regulations in the area of the project. The CM has the responsibility to promote safe site conditions by example and urge contractors to have organized safety procedures in force. Although each

contractor bears the responsibility to co-ordinate safety requirements common to all contractors and to see that safety provisions are included in construction contracts.

### **Schedule Management**

The schedule management area of knowledge encompasses all aspects of scheduling throughout the project. Scheduling is the management tool that best represents the controlled operations philosophy of the CM contracting system. It combines the element of time with the project's resources from the start design to owner occupancy. Scheduling eliminates or mitigates potential time-resource crises by predicting start and finish dates for intermediate project milestones. The use of scheduling is a means to an end, not an end in itself. It is a form of communication that should be presented in the simplest form with just enough detail to its message.

### **Value Management**

The value management area of knowledge encompasses a project's cost versus value issue. It has three value components: designability, constructability, and contractability. Designability relates value to overall project design. Constructability relates value to construction materials, details, means, methods, and techniques. Contractability relates value to contracting options, contractual assignments, and contracting procedures. The CM is expected to extract maximum value for the owner from the constructability and contractability options which are available.

## **E. THE NINE CM BODY OF KNOWLEDGE FROM HAMKI**

The Indonesian of Construction Management Professional (HAMKI) establishes nine areas of competency as its CM BOK for training the HAMKI members, they are:

- 1) Project Philosophy, Integration, Scope of Work, Work Packages and Engineering Review. This contains the competency need by a professional to understand construction project philosophy, the scope of work, work packages, and ability to perform engineering review for planning based on the aspect of technical included the competeness of construction drawing, the aspect of economic, and the aspect of constructability.
- 2) Professional Practice of Construction Management. This area of knowledge contains the ability that must be mastered by the professional in the practice of CM services.
- 3) Construction Planning and Scheduling. This refers to the ability to perform the whole picture for project development plan including construction planning and all matter in project time management.
- 4) Quality Management, Testing - Commissioning and Hand Over. This refers to the ability of planning the aspect of quality, conducting the performance assessment, and all matter related to hand over activities.
- 5) Cost Management. This refers to the ability to over all cost management, including cost estimating and budgeting, and cost control.

- 6) Coordinaton & Field Supervision, including Safety & Health Management. This refers to the ability to coordinate the inspection and supervision for field work including to manage the aspect of health and safety for the workers.
- 7) Procurement Management, Project Control & Project Management. This refers to the ability to areas of procurement management, construction administration, and construction contract.
- 8) Risk Mangement & Environment. This refers to the ability for anticipating and managing the risk elevated by the project including including the aspect of environment.
- 9) Organiation, Human Resource Development and Basic Knowledge of Socio Culture. This refers to the ability to the understanding, implementation of organization and mangement of project in the aspect of human resource, social, culculture and human behaviour in the project environment for interna and external stakeholders.

## **F. CM SERVICES**

The service of a CM firm vary in practices from a few services yielding the project owner few benefits to a both set of services ranging from assisting the owner in project feasibility calculations to property management of the project. In general, CM service is classified into two groups: preconstruction phase service and construction phase service. This paper lists services provided by the CM firms. For the detail please refer to Adrian (1985), The Committee of Construction Management (1987), and The Construction Industry Institute Strategic Planning Committee (1990a,b,c).

### **CM SERVICE AT PRE-CONSTRUCTION PHASE**

The following list is broader set out either the AIA or AGC for pre-construction phase. There are: Owner needs identification study; Project feasibility study; Tax analysis of project; Marketing research for proposed project; Assistance in obtaining permits & zoning; Budgeting; Value engineering; Parameter estimating; Scheduling of design & pre-construction; Identification of long lead items; Bid packaging; Awarding contracts; Setting out operating procedures and responsibilities; and Process paper work

### **CM SERVICE AT CONSTRUCTION PHASE**

The construction services offered by the CM firm, like it preconstruction services, have the objectives of controlling the project's cost, time and quality. Typical services performed during the construction phase are as follows: Detail planning and scheduling; Construction phase estimating; Operating procedures; Supervision; Inspection; Testing materials; Handling change order; Cost and time control system; Process contractor payments; Testing the completed project; Marketing the project; and Property management. Both CM pre-construction and construction phases service are clearly defined at the standard form of agreement available at AIA (Adrian, 1985).

## G. CM SERVICES IN INDONESIA: CASE STUDY 1

Yuliyanti, (2004) conducted a research regarding the work relationship between owner and Construction Management consultant. The following are the results of the study. The job position of the respondents is shown in Table 1.

Table 1. Job Position of Respondent.

No	Job Position	Number	Percentage
1	Technical staf	9	28
2	Project Manager	8	25
3	Site Manager	8	25
4	Director of Firm	2	6
5	Estimator & Supervisor	5	16
		32	100

Yuliyanti. (2004)

Table 2. CM Services Offered in Pre Construction Phase.

No	Description	Mean	Std dev	Rank
1	Preparing contract document	3.47	0.67	2
2	Preparing work packages for bidding	3.38	0.67	4
3	Helping the owner for negotiation with other consultants and contractors	3.63	0.61	1
4	Preparing heavy equipment for constrction.	2.13	0.79	7
5	Preparing project cost estimating and scheduling.	3.38	0.66	3
6	Writing project specification	2.88	0.75	5
7	Preparing program for worker health and safety (related to insurance)	2.53	0.95	6

Yuliyanti (2004)

In the study, Yuliyanty adopted item of the services from literature (see Soeharto, 1995). The services classified into three phases: pre-construction, construction and post-construction. The result of the study regarding CM services in pre construction phase is exhibited in Table 2. Three services most practices are: 1) Helping the owner for negotiation with other consultants and contractors; 2) Preparing contract document; and 3) Preparing project cost estimating and scheduling.

The result of of the study regarding CM services in construction phase is exhibited in Table 3. Three services most practices are: 1) Preparing project performance report (daily, and monthly); 2) Supervising the implementation of project; and 3) Arranging periodical project meeting.

The result of the study regarding CM services in post construction phase is exhibited in Table 4. Three services most practices are: 1) Preparing final report including evaluation of its success and deficiency; 2) Delivering the final physical results of the project; and 3) Delivering as built drawing to future maintenance purpose.

Table 3. CM Services Offered in Construction Phase.

No	Description	Mean	Std Dev	Rank
1	Preparing project performance report (daily, and monthly);	3.69	0.53	1
2	Arranging periodical project meeting.	3.44	0.70	3
3	Evaluating the construction method for future action.	3.09	0.96	6
4	Recommending process payment for consultant and laboratories testing.	2.69	1.10	8
5	Processing and analysing change order	3.13	0.83	4
6	Supervising the implementation of project	3.69	0.54	2
7	Helping problem solving on the project	3.13	0.87	5
8	Solving problem regarding claim and financial.	2.97	0.78	7

Yuliyanti, (2004)

Table 4. CM Service Offered at Post Construction Phase.

No	Description	Mean	Std Dev	Rank
1	Delivering the final physical results of the project	3.34	0.75	2
2	Preparing final report including evaluation of its success and deficiency	3.59	0.56	1
3	Delivering as built drawing to future extension and maintenance purposes.	2.75	0.62	3
4	Implementation of warranty and guarantee period	2.63	0.55	5
5	Performance appraisal	2.75	0.76	4

Yuliyanti, (2004)

## H. CM SERVICES IN INDONESIA: CASE STUDY 2

Sitanggang, (2008) also conducted a study concerning work relationship between owner and CM consultant. The following are the results of the study. The job position of the respondents are shown in Table 6.

Table 6. Characteristics of Respondent.

No	Job Position	Number	Percentage
1	General Manager	2	6.7
2	Asisten General Manager	2	6.7
3	Manager	20	66.6
4	Asisten Manager	6	20
	JUMLAH	30	100

Sitanggang. (2008)

Table 7. CM Services Offered in Pre Construction Phase.

No	Description	Mean	Std dev	Rank
1	Preparing project administration and contract document	3.53	0.77	9
2	Preparing work packages for bidding	2.77	0.77	13
3	Helping the owner for negotiation with other consultants and contractors	2.77	0.72	11.5
4	Conducting value engineering.	3.63	0.80	8
5	Preparing project cost estimating.	3.80	0.61	5
6	Preparing project scheduling.	4.03	0.49	1
7	Helping owner in Awarding contractor	2.77	0.72	11.5
8	Preparing Standard Operating Procedure	3.67	0.88	7
9	Marketing research	3.83	0.53	3
10	Tax analysis of the project	3.77	0.67	6
11	Obtaining building permit & zoning	2.83	0.95	10
12	Feasibility study	3.83	0.69	4
13	Helping owner in decision making in each phase of the life cycle.	4.03	0.61	2

Sitanggang (2008)

In the study, Sitanggang adopted item of the services from literature (see Adrian, 1985, Soeharto, 1995, Yulianty, 2004). The services classified into three phases: pre-construction, construction and post-construction. The result of the study regarding CM services in pre construction phase is exhibited in Table 7. Three services most practices are: 1) Helping the owner for negotiation with other consultants and contractors; 2) Preparing contract document; and 3) Preparing project cost estimating and scheduling.

The result of of the study regarding CM services in construction phase is exhibited in Table 8. Three services most practices are: 1) Preparing project performance report (daily, and monthly); 2) Supervising the implementation of project; and 3) Arranging periodical project meeting.

The result of the study regarding CM services in post construction phase is exhibited in Table 9. Three services most practices are: 1) Preparing final report including evaluation of its success and deficiency; 2) Delivering the final physical results of the project; and 3) Delivering as built drawing to future maintenance purpose.

Table 8. CM Services Offered in Construction Phase.

No	Description	Mean	Std Dev	Rank
1	Preparing project performance report (daily, and monthly);	3.97	0.61	4
2	Planning the project in various phases and arranging meeting.	4.10	0.40	1
3	Evaluating the construction method & operating procedure for future action	3.77	0.67	5.5
4	Inspecting the project activities as specified	3.77	0.67	5.5
5	Processing laboratories testing.	3.33	0.71	10
6	Supervising the implementation of project	3.97	0.55	3
7	Handling project administration and helping problem solving on the project	3.47	0.81	9
8	Controlling time, cost and quality	3.53	0.62	7
9	Processing certificate of payment for contractors	3.17	0.59	11
10	Handling the process of change order & solving problem regarding claim and financial	3.37	0.61	10
11	Final testing and decommissioning	4.07	0.52	2
12	Marketing the project	3.50	0.77	8

Sitanggang (2008)

Table 9. CM Service Offered at Post Construction Phase.

No	Description	Mean	Std Dev	Rank
1	Delivering the final physical results of the project	3.30	0.75	7
2	Preparing final report including evaluation of its success and deficiency	3.93	0.52	1
3	Delivering as built drawing to future extension and maintenance purposes.	3.60	0.77	5
4	Implementation of warranty and guarantee period	3.73	0.69	4
5	Performance appraisal	3.83	0.59	2
6	Preparing payment for outstanding work and finalise financial report	3.60	0.72	6
7	Asset recording, and audit preparation	3.80	0.71	3

Sitanggang (2008)

## I. SUMMARY

This paper has discussed various project contract systems especially the Agency Construction Management (ACM), and the body of knowledge applied to ACM from CMAA and HAMKI. Services provided by the ACM are also shortly introduced. It's a business organization that contracts with owners as an agent to manage the process that produces facilities for owners. The obvious characteristic of the Agency Construction Manager system is there are an absence of single prime contractors such as GC or D-B contractor and the inclusion of the construction manager. The ACM work from the start of the design process until the end of the warranty period. So the owner leaves everything to the ACM. However, real practices in Indonesia had many variants. Two cases studies of CM practices showed that services provided so-called CM consultants offered in a large variety of services to the construction owners.

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