

# A STUDY ON CONSTRUCTION CONTRACTS AND PAYMENT METHODS IN CM AT RISK SYSTEM -APPROACH WITH ESTABLISHING CONTEXT OF GMP-CM SYSTEM -

JeaSauk Lee <sup>1</sup>, and JaeYoul Chun <sup>2</sup>

<sup>1</sup> Research Prof. Dept. of Architectural Engineering, Dankook University, Seoul, Korea; Ph.D.

<sup>2</sup> Prof. Dept. of Architectural Engineering, Dankook University, Seoul, Korea; Ph.D.

**ABSTRACT :** When we compare CM system with Design Bid Build system, we can see two striking features in CM system. First, CMr participates in construction team along with Owner, Designer and Constructor. The newcomer can change boundaries of function and responsibility. Second, Compatibility through each phase and Objectivity of decision-making become more important, because relation among stakeholders changes from a rectilinear to a network. However, it is not clear how the risk of completion is reasonably treated. So we have to think about the relations between Owner and CMr, CMr and Specialist Contractor from a point of trade risk. This paper covers them.

*Key words :* CM at Risk, Guaranteed Maximum Price, Payment Method

## 1. INTRODUCTION

Korea introduced Agency CM and have struggled to equip the CM system. But several problems still exist.

- 1) Obligation of CMr is ambiguous. Besides, detailed manual issued by some civil organization lacks common consent or is perfunctory.
- 2) Educational system is irregular and varies from organization to organization. Thus, public trust can't be obtained.
- 3) CMr's legal Liability is not very clear. It is tangled and mixed with Liabile Supervision.
- 4) Owners don't know much about CM system's Merits & Demerits. Also, lack of objective Post Evaluation System and arbitrary evaluation arouse people's doubt.

If GMP CM, which is different from Agency CM, is applied to this unstable situation, we can easily expect that misunderstanding will cause confusion in every part of construction society not to mention between supplier and demander.

Thus, if GMP-CM will be applied, we have to set precise purpose and circumspect plans. This paper looks to make sure of the following items.

- 1) Comparing Project Procurement System by PMP and POP works and services allocation.
- 2) How GMP-CM was generated in the United States on Context of official documents.
- 3) Difference between CMr's responsibility and liability in Agency CM and that of in GMP-CM
- 4) Comparing relation of Owner & Specialist-constructor and CMr & Specialist-constructor from a point of payment process and responsibility of not paying.

## 2. PMP & POP

In economic behavior, Goods, Service and their compound can be objects of transaction. PMI mentions, in PMBok, that the two kinds of Project Process exist in project. One is Project Product-Oriented Process and the other is Project Management Process. Lee, in his dissertation in The University of Tokyo, called each of them POP and PMP.

He said PMP are to satisfy expectations or request of client, using Management knowledge, technology and Tools for Trading off between Cost/Time/Quality, coordinating member's interest, and balancing certain condition & uncertain condition. And POP are concerned with specifying and creating the project product. PMP and POP overlap and interact throughout the project, but CMr's Management activity belongs to mainly PMP as a service.

And, Products of POP are responsible for the POP Contractor if PMP might have effect on the POP process.

Sometimes, CMr additionally contracts a part of POP works like General Condition Constructions. In this case, CMr plays not only as a Manager but also as a POP Operator, so payment also includes services Fee and cost of goods.

Agent CM is a Service-Oriented System, and Design Bid Build System is Goods-Oriented System. It can be said that GMP-CM is located somewhere between Agent CM and Design Bid Build System, Conversing CMr's position in construction phase. Table 1 is Typology of Construction Procurement System by allocation of PMP& POP Activity.

We can distinguish each System with Work and Service allocation. When Design Phase comes to an end, CMr's position shifts from Owner's agent to Constructor(= not stipulated Sum Contractor) and thus CMr comes to be opposed to the owner to some extent because of GMP.

There was often an adversarial relation among parties such as CMr and Owner, CMr and and Designer. If GMP is

settled, CMr could not serve concurrently as supervisor because the position of CMr is constructor similar to that of GC. It is therefore necessary for designer or other inspector to be involved in construction phase for inspecting objectivity of Qualities.

**Table 1.** Typology of CM System

Pattern	POP&PMP division type	POP	PLANNING	DESIGN & DRAWING	CONSTRUCTION
		PMP	Program Mgt	Design Mgt	Construction Mgt
Design & Management	Managed By A/E	POP	OWr	A/E	Separate Trade Contractors
	(or + CM consortium)	PMP	OWr+A/E	OWr+A/E	OWr+A/E
Construction Management	CM as owners Staff	POP	OWr+A/E	A/E	Separate Trade Contractors
		PMP	OWr(+CMr)	OWr(+CMr)	OWr(+CMr)
	Agency CM With Cost-Plus-Fee	POP	OWr+A/E	A/E	Separate Trade Contractors
		PMP	OWr+CMr	OWr+CMr	OWr+CMr
	Cost-Plus-Fee with Penalty and Bonus CM	POP	OWr+A/E	A/E	Separate Trade Contractors
		PMP	OWr+CMr	OWr+CMr	CMr
	Guaranteed Maximum Price CM	POP	OWr+A/E	A/E	CMr (& or several Trade Contractors)
		PMP	OWr+CMr	OWr+CMr	CMr+A/E
	General Lump-Sum Contract CM	POP	OWr+A/E	A/E	CMrasGC
		PMP	OWr+CMr	OWr+CMr	CMr+A/E
Management Contracting	stipulated Sum Contract	POP	OWr	A/E	CMrasGC
		PMP	OWr	A/E	CMr

Not only ordinary case but also Fast Tracking, It becomes trouble that increase of construction cost and delay of schedule caused by deficiency of design. It should be clear that the accomplishment of design must be high.

### 3. GENERATIVE CONTEXT OF GMP CM

When we look through history, AGC(Associated General Contractors of America), in its house organ (Jan,1922) Cost-Plus-Fee Method Provisions, described two construction account patterns, Cost-Plus- Fixed Fee and Cost-Plus-Fee with Penalty and Bonus. In certain circumstances, these are for the Owners who don't like Lump Sum contract.

However, AIA(American Institute of Architects) contains no mention of Cost-Plus-Fee with Penalty and Bonus or GMP until 1920. On the other hand, AIA curtailed jobsite Function to escape from Liability for warranty especially Supervision. As a result, architect's contribution to the jobsite became a formal act making supervision degenerate into Visiting. (Supervision-> Inspection->Observation->Visiting)

In return, Client came to need someone who would take over the Supervision. This is why CMr appeared from a point of job site work. This resembles the way Liabile Supervision appeared in Korea.

In the mid 1960's, there was a law in New York State that prescribes that construction be divided into several Specialist Contractors. They were to be managed by a integration manager, who was hired for public client as a Fee based agent. This is the background of Public sector Agency CM in U.S.A. GSA accepted Agency CM in 1971, but WTC, ordered by New Youk State Ports and Harbors Bureau, started to be constructed in 1967. AGC developed Cost-Plus-Fee with Penalty and Bonus and established it as Standard Form of Agreement Between Owner and Construction Manager (Guaranteed Maximum Price Option) in Document No.8(1974). This developed into AGC500. Later in 1991, AGC and AIA enacted an agreement (AIA-A121/CMc and AGC565) together and Finally, GMP-CM was authorized as a whole industry Procurement System. In 1994, an intermediary form, Cost plus Fee CM without GMP was described officially in AGC's Standing Point, which reduced CMr's risk.

The latest documents on Agency CM are AGC510(=AIA's B 801 CMA), AGC520(=AIA's A101 CMA, A201 CMA), AGC525(=AIA's G 701 CMA), AGC530(=AIA's B 141 CMA). The latest documents on CM at Risk are AGC230 (2000 =AIA's A131CMc, A210), AGC250(2000=AIA's A111, A121CMc, A201), AGC565 (use with A201, same as A121CMc), AGC566(use with A201, same as A131CMc). Construction Management at Risk with GMP is prescribed in CMAA(Construction Management Association of America)'s Document CMAR series also.

GSA/PBS has maintained Agency CM by Fixed Fee (Excludes a few states, cities...etc), which was selected through competing in price (negotiation contract is not allowed in public contract). However, GMP-CM with single contractor is spreading rapidly nowadays on construction phase. GSA/PBS recognized that separate contracting can't always guarantee good effect and that advantages of Fast Tracking offset disadvantage occasionally. CMr is expected to have Constructability and Value Engineering in design phase from GSA/PBS.

### 4. CMr's LIABILITY IN GMP CM

Legal personality is decided by a contract. And liberty of contract is applied in contract. Korean and Japanese civil law classifies Using Type of other people's labor and work into 3 typical contract types. These are Employment, mandate, (Undertake) Contractor. Employment is the wage in return for labor. And in mandate, provider's professionalism and obligation of virtuous management in dealing with service is important. (undertake) contract is a promise between owner and the person who undertakes the work, that the owner will pay contractor if he completes the mission. So (undertake) contract has chance and risk at the same time. And there are cases of imperfect contract because of frequent demand of design change or price increase. In (undertake) contract, the process of work is no object of assessment. So Contractor can accomplish the work by

outsourcing. In that case, intermediary exploitation and multilevel profit margin is to be considered.

On the other hand, there is a fiduciary who acts not for himself but for the benefit of the owner. It is a sort of mandate. In CM system, CMr is a fiduciary. If this kind of contract is to be formed, fiduciary must act with the right of representation, on behalf of the Owner. So whatever the fiduciary does, it directly affects the owner. CMr participates in construction as a retained agent of the owner. In other words, fiduciary does legal acts like making a contract, whereas the owner is responsible for the results of them.

Therefore, there form not only the relation of rights and duties between the owner and the fiduciary (inner relation) and its secondary relations that come from the fiduciary's right of representation. But, actual CM Contract is different from the typical Contract. CM Type is determined by Inner relation between Owner and CMr. According to the agreement between the two, CM Type gets close to either Employment, mandate, (Undertake) Contractor. This is related to amount of risk and chance of benefit. Considering all those facts, we can figure out that CM at Risk as a GC and CM at Risk as Penalty and Bonus with MTPC in CM for Fee is very different. Thus the term of "CM at Risk" is ambiguous. The term "GC CM" also ambiguous, for the meaning of GC CM covers Cost plus Fee and Cost plus Fee with GMP by General Contractor, which are very different.

**Table 2.** CMr's Liability

Method of procurement		Liability	
Cost Plus Fee	Agency CM (=Pure CM) No Risk no Return)	Duty of effort as virtuous and honest agent (No limit Construction Price)	
	CM at Risk	MTPC(Maximum Total Project Cost: early GSA CM) Look: AIA-A131=AGC566	Duty of effort with Penalty and Bonus with MTPC
		GMP(Guaranteed Maximum Price, according to AGC 230 & 250, setting GMP is an option of Cost-Plus- Fee)	limited Liability for completion construction work with GMP
Lump Sum	With stipulated Sum Contract (All contingency for completion is included)	Unlimited Liability for completion construction work	

Logically there are 4 patterns in CM. Agency CM which maintains pure agent with open book in construction phase and the risk of completing the construction work is owned by the owner. on the contrast, Stipulated Sum Contract in which CMr converted to Undertake Contractor with Closed Book, and the responsibility for completion shifts to the CMr. And GMP CM and Penalty or Bonus with MTPC CM is located between the two. But generally speaking, there are two patterns in CM. Those are Agency CM and GMP CM.

We regard Both patterns maintain Cost Plus Fee in construction phase. GMP-CM can be viewed as two birds with one stone system that clear PMP process and a secure completion of construction.

Lump-Sum contract CMr is logically possible. But Even if the contract was made with CM Firm, Lump Sum Contract with Closed Book which transfers the risk to the contractor doesn't differ from Design Bid Build System on right and duty or obligation. it is similar to MC (Management Contract) system in UK.

From CMAA CMAR -1, CMr can have several positions.

- 1) General Contractor,
- 2) supervisor on entire Project(several separated General Contractor)
- 3) supervisor on entire Project and he also one of Contractor But CMr as General Contractor is one thing and GC in DBB is another. Because basic rules of Cost plus Fee still apply to this case.

GMP Negotiation with exist CMr is bad match for Public Sector because it is not an competitive method.

CMr's Fee competition for GMP CM is no good to Owner and CMr. Because, due to the possibility of damaging construction management aspect, for example, schedule, quality, teamwork, etc. We should take care of the incentive set on the basis of GMP with same reason.

After settling the GMP, the change order from Owner bring to claim. Hence, Owner's contingency should be prepared above CMr's contingency in GMP.

**5. TERMS OF PAYMENT**

After determining objects of transaction (Goods, Service and their compounding), we have to choose a term of payment because that can affect the legal responsibility, attitude, productivity, and quality of the outcome. Especially, in Construction Phase, Cost plus Fee, Cost Plus Fee with Penalty and Bonus, Guaranteed Maximum Price, Lump Sum. is terms of payment. Only GMP CM will be discussed here.

Changing Agent CMr before construction phase to GMP CMr in construction phase, for example, Owner request CMr setting of GMP 2 months before he go out to bid. CMr hands in GMP within 30 days and the owner makes up his mind to accept or not. This kind of process is called Fixed negotiated Price.

Another way to set up GMP is adding CM Fee, Contingency, General condition Construction Cost to the sum of every specialist contractor's estimated amount. In GMP CM, target cost is fixed in advance and accounts are settled after construction. GMP CM is a hybrid system of Design Bid Build and Agency CM.

In GMP CM, Specialist Contractors contract with CMr, so they are secondly contractor from owner's point of view. Sometimes Owner contracts directly with Other Prime Contractor in GMP CM System. Any Way, payment for CMr include

- 1) Fixed Lump Sum Fee (Profit, Home Office Overhead, Services costs),
- 2) General Conditions Costs (On-site Overhead, General Conditions Construction),
- 3) Subcontractor Costs (with out markup).

Before construction Phase 1) only paid for CMr, for construction phase, in the case of Agent CM 1) or 1)+2) is paid for CMr, and in GMP CM 1)+2)+3) is paid for CMr. You must keep in mind that "Cost+Fee" in Agent CM and in GMP CM has different range of cost and calculation.

At Agency CM, contract between Owner and Trade Contractor is described in AIA's A101 CMA and A201 CMA(=AGC520). In this case Owner contract directly with Specialist contractor, CMr is legally not a party.

**Table 3. Contract Parties and Points of Matters**

Division	AIA(AGC)	Contract parties	Points of Matters	
General Condition	AIA's A201 CMA (=AGC520)	General Condition	General Conditions are common for Agency CM and CM at Risk.	
CM Adviser	AIA's B 801 CMA (=AGC510)	Ow-CM		
	AIA's B 141 CMA (=AGC530)	Ow-A/E		
	AIA's A101 CMA (=AGC520)	Ow-Co	Each specialist Contractor is selected by Owner with advice of CMr and Architect. Contract is Lump-Sum. Not necessary Contingency allowance.	
CM Constructor	Cost + Fee (no GMP)	AIA's A131CMc (2000=AGC230, AGC566),	Ow-CM	Even for construction phase, Owner and CMr's Contract is Cost + Fee. Control Estimate with no grantee is presented for Owner by management target(A131 CMc-2.2). Not necessary Contingency allowance. Each specialist Contractor is selected by Owner with advice of CMr and Architect. Each specialist Contractor contract with CMr by Lump-Sum.
	Cost + Fee with GMP	AIA's A121CMc (2000=AGC250 AGC565)	Ow-CM	Even for construction phase, Owner and CMr Contract Cost plus Fee. GMP is provisional Contract Sum not Lump Sum. On the time of set up GMP, It is necessary that Construction Drawings are completed. (A121 CMc-2.2.1), Contingency allowance is necessary(A121 CMc-2.2.2.4) Each specialist Contractor is selected by Owner by bid with advice of CMr and Architect. Each specialist Contractor contract with CMr by Lump-Sum. If Owner Nominate any specialist Contractor without CMr's recommendation, the Price difference is reflected in GMP (A111-10.1.2)

In GMP CM, there are two cases of Risk Sharing, the first CMr and an Owner entirely assume the risk of owner payment, that is AIA's A401(1997), AGC650(1998) and AGC603(2000), and second Specialist Contractor shares it, that is AGC655(1998) and AGC604(2000). However there is no regulation in AIA. Anyway, GMP CM is not Undertake Contract, because CMr promptly pay to Specialist Contractor without markup if he was paid by an Owner.

The payment request with accounting records which is common in cost plus fee system, and it should be used for GMP CM. As a result, GMP CM can stand comparison with CM advisor or No GMP GC CM in aspect of cost transparency. In CM for Fee System, Owner and Specialist Contractor contract with lump-sum directly, and payment for Specialist Contractor also directly. CMr should only calculate Specialist Contractor's accomplished progress to total percentage for Owner could pay, on the authority of A101/CMA.

It is noted that constructor CM(=CM at Risk) follows pay-if-paid clause. Hence, CMr does not bear the payment risk to Specialist Constructor in CM at Risk.

In USA, there is a similarity in CM System as well as DBB

and DB system according to the contract between Contractor and Subcontractor. From the viewpoint of payment to subcontractor, GMP CM is different from a stipulated Lump Sum contractor. Not to mention Management style and risk allocation. If the relation of Owner and CMr is stipulated sum contractor, pay-if-paid clause appears to be unfavorable principle for Specialist contractor. If the Prompt Payment Act was observed like federal construction Project, it is a duty to pay to subcontractor within a period even if there is no payment from Owner. This is an unfavorable principle to CMr not being stipulated sum.

CMr should be responsible for the risk of trade contractor at GMP CM. It is therefore necessary to have payment bond not only between a CMr and an Owner but also between CMr and Subcontractor.

Contingency should be included in GMP to guarantee the construction not to be stopped. Contingency is Premium regarding CMr's risk to construction accomplishment. Occasionally the GMP proposed by CMr is inadequacy, so Owner needs to check closely adequacy of that. It is possible to doubt of unfair benefit through CMr's direct construction, as the case of General Condition Construction.

**Table 4.** CMr's Cost , Fee and Payment Root for Trade Contractor

Division		The range of CMr's Cost and Fee		Payment Root for Trade Contractor(AIAG702,703) and Ge-Sc Contract (A111-10)
		Pre-Construction	Construction	
CM Adviser		Only CMr's Lump Sum Fee	Only CMr's Lump Sum Fee	Percentage of Each Work(Because Each TC Work is normally Lump sum Contract), (Unnecessary Schedule of Values necessary Accounting records:A111-11) Request: Tc→(CMr+ A/E)→Ow Payment: Ow→Tc
CM Constructor	Cost + Fee (no GMP)	Only CMr's Lump Sum Fee	CMr's Lump Sum Fee + {(Actually incurred by the Contractor) = (Every TC's Work + CMr's Own Work) }	(Unnecessary Schedule of Values but necessary Accounting records : A111-11) Request (Tc→CMr)→A/E→Ow Payment: Ow→CMr→ Sc Percentage of Each SC Work(Because Each Work is normally Lump sum Contract
	Cost + Fee with GMP	Only CMr's Lump Sum Fee	Percentage of the entire GMP = Percentage of {CMr's Lump Sum Fee + Every TC's Work + CMr's Own Work}	(based on Schedule of Values A111-12.1.5 and necessary Accounting records:A111-11) Request:((Tc→CMr)→A/E→Ow Payment: Ow→(CMr→ Sc) Percentage of Each Work(Because Each SC Work is normally Lump sum Contract

## 6. CONCLUSION

1. GMP CM as a type of CM at risk is a term for a construction phase, not for pre-construction phase. Briefly speaking, pre-construction phase is Adviser CM at any case.
2. Cost Plus Fee is a basement for every CM system, GMP CM provides Owner an option in construction phase on the above of Cost plus Fee.
3. Even in GMP CM, it is natural to disclose process and reason of specialist contractor selection, details of construction cost, Payment base, etc.
4. Penalty and Bonus system of sharing the Over Run or Under Run of construction cost with Owner and CMr should be treated carefully because CMr must behave himself as a virtuous and honest agent. Because CMr is hired to Owner for Good Reference and Repeat Work, it is different with Stipulated Lump Sum Contractor for maximizing his own profit.

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