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Survey of Korean CM Contracts for Current Status and Future Direction: Based on 1997 to 2013 Statistics

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Abstract: As domestic construction investment has been gradually reduced, expanding overseas construction is one of the most important issues for Korean construction companies. Among these issues, strategies for overseas CM services have widely been discussed, because the CM services have features of high growth potential and value-added area when compared with other construction sectors. Therefore, recent efforts focus on further development in advanced CM capabilities and expansion to overseas market. However, there has been lack of quantitative research to investigate current status and future direction of CM industry. In this sense, this research investigated what CM has achieved for the past 17years (between 1997 and 2013) and what CM should accomplish for future strategies. The purpose of this research is to statistically analyze total of 2,983 CM service contracts over the past 17 years published in KISCON (Knowledge Information System of Construction Industry) in order to examine current status of CM industry in terms of market type, contract size, commodity type, and owner's type. Based on this research, it is expected to suggest for future strategies and development directions from the CM industry perspective that could provide quantitative analyses, improve current CM statistics systems and strengthen the competitiveness in international CM market.

Keywords: Construction Management, Information System, Knowledge Information System of Construction Industry (KISCON), Public announcement system for the capacity of Construction Management (PCM), Big-Data

I. Introduction

Construction Management (CM) has been making a continuous progress since 1996 when enforcement basis for Framework Act on the Construction Industry was established. Amid reduced investment in the recent domestic construction business compared to GDP, the CM industry is emerging, which is expected to create synergy effect in connection with planning, design/engineering, procurement, and construction, and various efforts are being made to achieve expansion of its presence in other countries along with sophistication of the relevant technologies. Further, as construction project owners starts to see CM as a necessary tool and CM developers improve their technological capabilities, making strategies to win more CM projects becomes more significant than ever. The CM industry has substantial future growth potential (Oh et al. 2012) and produces higher foreign-exchange earning rate than simple construction projects. (MOLIT 2010).

The CM industry, however, has difficulties in promoting overseas expansion and capability improvement due to institutional limitations such as limited business scope decision and inflexible CM fee standards (Kang et al. 2014), small & medium sized CM firm (Jung et al. 2014), and products and technological capabilities (Lee 2011). In addition, there has been lack of quantitative studies on the CM industry's current conditions, issues, and development directions based on detailed statistics data. Developing the CM industry is a highly urgent task because it will contribute to overseas expansion of Korean construction technologies and making it more competitive.

In this sense, the purpose of this research analyzed a total of 2,983 CM service contracts between 1997 and 2013, which are registered in Knowledge Information System of Construction Industry (KISCON) to objectively identify the current status of the CM industry (market types, contract size, work types, owner types), so as to, based on the quantitative data, go over the past of the industry and derive various strategies to develop it.

Ⅱ. KISCON : PCM

As part of the domestic construction industry DB establishment project, KISCON was developed in 1999 to build a nation-level integrated construction information management system in order to raise transparency of the industry, strengthen competitiveness, and increase efficiency of information demand subjects by establishing various utilization systems. 'Public Announcement System for the Capacity of Construction Management (PCM)' has been operating since 2003.

PCM includes five items (contract title, contract period, business scope, actual results type, and contract amount of CM Results Table), which takes up the major part of data for the CM industry status analysis, and nine detailed items in construction outlines and nine detailed items in CM contracts (Table 1).

However, as registering CM results to KISCON is not mandatory, data can be missed, thus it is hard to exactly show the overall CM market. And results data cannot be downloaded and using item-specific information is restricted, so users have difficulty to utilize it.

In other words, to identify CM project type based on

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TABLE Ⅰ
KISCON : PCM ELEMENTS

Category	Detailed items
Construction outlines (9)	Project name, Owner name, Work type, Detailed work type, Work site, Contract type, Work period, Order type, Total work cost
CM results (9)	Contract title, CM owner category, CM contract type, Contract date, CM commencement date, CM termination date, Contract price and amount for work completed, Payment method, Business scope

KISCON data, details on 'contract name' and 'business scope' should be inferred, and for more detailed analysis, a great deal of effort and time are required.

Ⅲ. CM INDUSTRY TREND: 1997 TO 2013 STATISTICS

To identify overall status and characteristics of the CM industry based on quantitative data in the comprehensive point of view, 2,983 contracts (total contract amount: 3,517 billion won) were analyzed. In fact, the number of results between 1997 and 2013, specified in KISCON was 3,186, but as divided CM contracts were integrated, the number of contracts for analysis was reduced to 2,983 (Figure 1).

A. CM Market Trends

CM contract-winning results were analyzed by being classified into domestic (D), international (I), public (P), and private (C) (Table II-1). Among the domestic projects, which take up 92% of total contract amount, domestic-public (DP) projects amounted to 53% (1,863 billion won) while domestic-private (DC) projects amounted to 39% (1, 363.3 billion won). In terms of the number of projects, DP and DC were 982 (34%) and 1,747 (40%), respectively, and as for average contract amount, DP was 2.4 times higher than DC. It may be because the CM fee standards of DP projects including supervising work is higher than that of DC projects (Jung et al. 2014).

The result of comprehensive analysis of the CM industry shows that unlike the early 2000's when laws and regulations on CM were established, in the mid 2000's, public and private CM projects in Korea started to increase to improve CM price system and enhance competitiveness. And owing to building and expanding infrastructure system, domestic CM contracts total amount has highly increased.

In contrast, overseas construction took up only 8% of the total amount. But due to considerable effort to secure CM competitiveness in the late 2000's, the number of CM contracts and contract amount has been increasing rapidly since 2010. Therefore, Korean CM businesses' making inroads into overseas market is expected to be promising. The contracts awarded of overseas CM from 2010 to 2013 increased by 8.8% (9.1% when excluding Yongsan Relocation Program project: 2 contracts in 2007, 1 contract in 2009) compared to the period between 2006 and 2009 and the number of contracts has increased by 4%.

TABLE Ⅱ
VARIABLES AND VALUES FOR CM WHITE BOOK

Overview of CM Statistics 1997 to 2013 : 3,517 billion won for 2,983 projects

Variables	Code	Description	Statistics / Survey / Remarks		
1. Type of Market*	Location and Public / Private		CM Contract Total Amount	CM Contract Average Amount	No. of Projects
	DP	Domestic Public	1,863 billion won (53%)	1,9 billion won	982 contracts (33%)
	DC	Domestic Private	1,363 billion won (39%)	0.8 billion won	1,747 contracts (59%)
	IP	International Public	41 billion won (1%)	0.4 billion won	94 contracts (3%)
	IC	International Private	250 billion won (7%)	1.6 billion won	160 contracts (5%)
2. Size of CM Contract*	CM Contract Amount (Including Joint Venture)		CM Contract Total Amount	CM Contract Average Amount	No. of Projects
	1	Less than 0.1 billion won	39 billion won (1%)	0.04 billion won	1,020 contracts (34%)
	2	Over 0.1 and less than 1 billion won	500 billion won (14%)	0.4 billion won	1,196 contracts (40%)
	3	Over 1 and less than 3billion won	890 billion won (25%)	1.7 billion won	518 contracts (17%)
	4	Over 3 and less than 10 billion won	1,043 billion won (30%)	4.8 billion won	219 contracts (7%)
	5	Over 10 billion won	1,045 billion won (30%)	34.8 billion won	30 contracts (1%)
3. Type of CM Owner**	Five Types of CM Owner		CM Contract Total Amount	CM Contract Average Amount	No. of Projects
	PM	Private Manufacturing	218 billion won (6%)	0.8 billion won	264 contracts (9%)
	PN	Private Non-manufacturing	1,204 billion won (34%)	0.8 billion won	1,557 contracts (52%)
	GO	Government Organization	559 billion won (16%)	2.6 billion won	212 contracts (7%)
	LO	Local-government Organization	380 billion won (11%)	1.0 billion won	380 contracts (13%)
	EO	Et cetera Organization	1,156 billion won (33%)	2.0 billion won	570 contracts (19%)

* Classifications of CM market type and contract size (Jung et al. 2014)
** Classifications of Owner type (Framework Act on Construction Industry 2014)

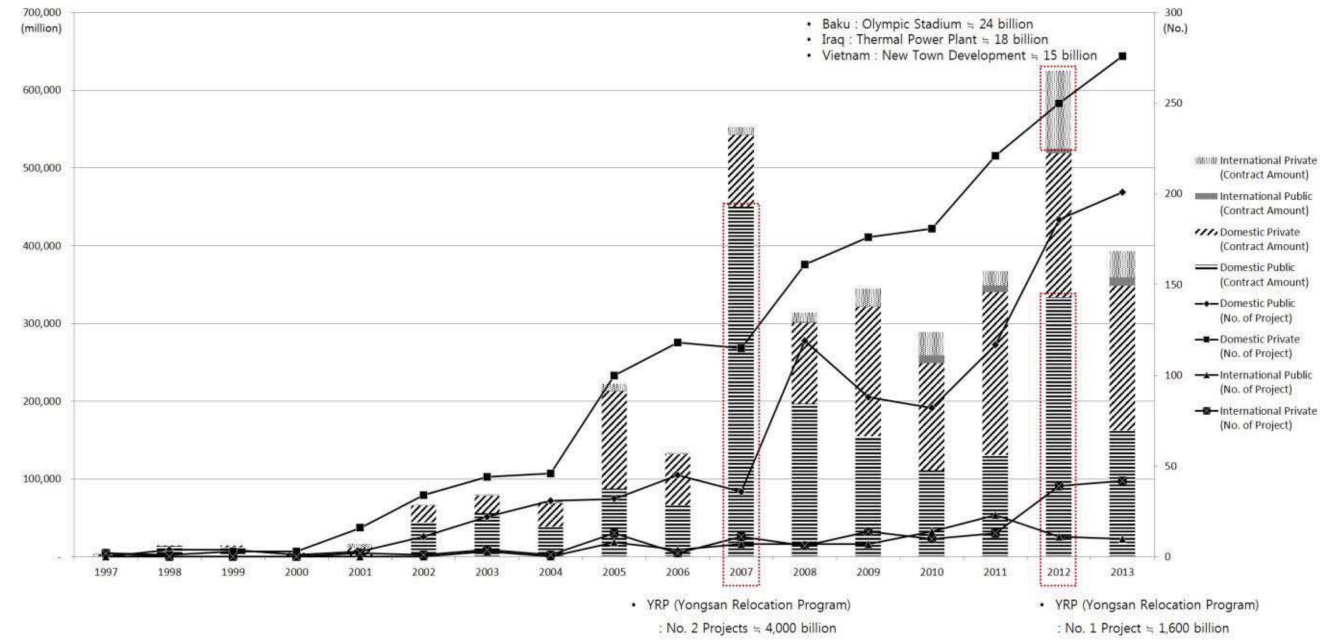

Fig 1 . CM INDUSTRY TREND : 1997 TO 2013 STATISTICS

In addition, the overseas CM contract amount on average has nearly doubled. In the case of international-private (IC) construction, the CM contract total amount is still relatively small but the number of contracts awarded has been increasing due to development of commercial facilities, infrastructures, plants, and multi-complexes in some Asian nations including China and Vietnam.

B. *CM Contract Size*

The next analysis variable is CM contract size as shown in Table II-2. CM contract amount range is classified into less than 0.1 billion, 0.1-1 billion, 1-3 billion, 3-10 billion, and 10 billion or more, and each market type is divided into five sections (Table III).

The number of domestic CM projects (2,729 contracts, 92%) was 10.7 times more than international projects (254 contracts, 8%), and the average CM project contract amount, which represents project scale, were approximately 1.9 billion won for DP (1.3 billion won when excluding Yongsan Relocation Program project), 0.8 billion won for DC, 0.4 billion won for IP, and 1.6 billion won for IC.

First of all, the number of CM projects less than 0.1 billion won was 1,020, 34% of the total contracts, but the amount was 38.7 billion won, only 1% of the total amount. It is because most of the projects were a specific task entrusted like feasibility study, schedule and progress management, and design VE (Value Engineering).

The number of CM projects ranged 0.1 billion - 1 billion won was 1,196 (40%), the highest number of contracts, and the contract amount was 499.8 billion won, 14% of total contract amount. The number of DC2 CM projects was 768 (64%), 315.8 billion won (63%), while the average contract amount was approximately 0.4

TABLE Ⅲ

SIZE OF CM CONTRACT AMOUNT

Overview of CM Statistics 1997 to 2013 : 3,517 billion won for 2,983 projects

Classification			CM Contract Total Amount	No. of Projects	Classification			CM Contract Total Amount	No. of Projects
Domestic	Public	DP1	13 billion won	338 contracts	International	Public	IP1	1 billion won	24 contracts
		DP2	138 billion won	298 contracts			IP2	18 billion won	58 contracts
		DP3	407 billion won	232 contracts			IP3	17 billion won	11 contracts
		DP4	475 billion won	97 contracts			IP4	0.4 billion won	1 contracts
		DP5	831 billion won	17 contracts			IP5	0 billion won	0 contracts
	Private	DC1	23 billion won	620 contracts		Private	IC1	2 billion won	38 contracts
		DC2	316 billion won	768 contracts			IC2	28 billion won	72 contracts
		DC3	420 billion won	247 contracts			IC3	47 billion won	28 contracts
		DC4	457 billion won	103 contracts			IC4	106 billion won	18 contracts
		DC5	147 billion won	9 contracts			IC5	68 billion won	4 contracts

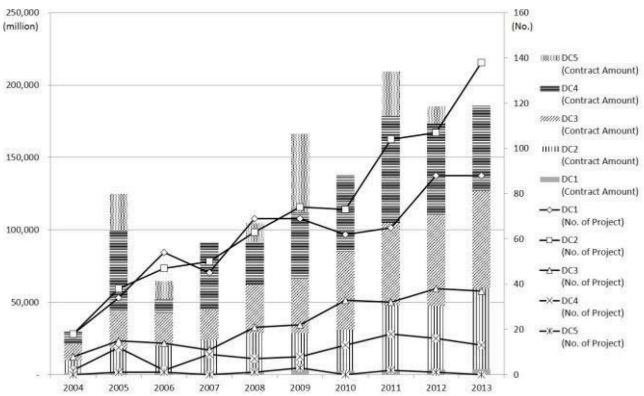

Fig 2. DOMESTIC-PRIVATE (DC) : 2004 TO 2013 STATISTICS

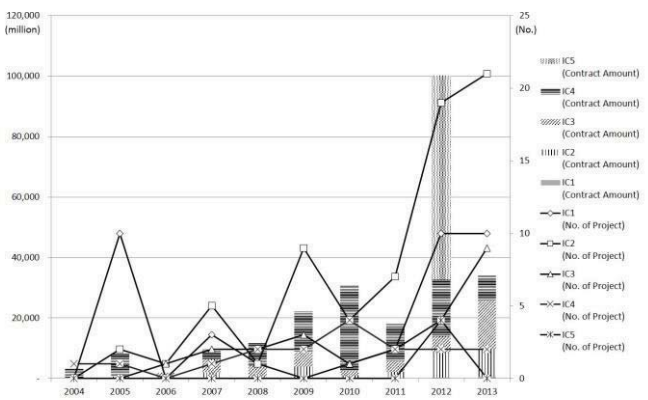

Fig 3. INTERNATIONAL-PRIVATE (IC) : 2004 TO 2013 STATISTICS

billion won. In 2011 and 2013, the number of projects rapidly increased, so the average number of contracts between 2010 and 2013 (105 contracts) was 1.8 times more than that between 2006 and 2009 (Figure 2).

The number of CM projects ranged between 1 billion and 3 billion won was 518 (17%), and the amount was 8,904 (25%). In particular, the DP3 CM projects (excluding Yongsan Relocation Program project) took up 52% in 2012 and 46% in 2013 of total DP projects in terms of amount. Besides, in the case of the IC3 project, the first contract was made in 2010, and the number of contracts and amount increased in 2013 when many educational and welfare facilities were built in Asia, Africa, and the Middle East regions.

The number of CM projects ranged between 3 billion and 10 billion won (4) was 219 (7%), and the amount was 142.6 billion (30%). And the number of CM projects of at least 10 billion (5) was 30, 1% of total contracts and the amount was 145.4 billion (30%). In the case of CM projects more than 3 billion won, the number of contracts was low but the amount was high because of Yongsan Relocation Program project included (2 contracts in 2007 and 1 contract in 2012). In contrast, the number of IP project (4) was only one, the water supply facility installation project in Vietnam, and the number of IP project (5) was none.

As for international-private (IC) projects, which the Korean CM businesses need to target, based on improved project management competence, the first contracts were awarded in 2012 in Europe, Asia, and Middle East (to build Olympic stadium, Thermal power plant, New town development, and resort), which was a bridgehead for making inroads into overseas market.

C. *CM Owner Type*

CM business ability depends on CM project owner's nature, characteristics, and objectives (Jun et al., 2004). Thus, in this research, five CM owner types, which was defined in Framework Act on the Construction Industry were analyzed in combination with market type and contract size (Table IV). As for domestic CM project owners, the number of private project owners (1,024) was 2.1 times more than that of public project owners (480).

In the second contract amount range, the numbers of domestic-private (DC) and international-private (IC) projects were the highest at 767 (44%) and 43 (54%), respectively. The average CM contract amount is approximately 80.8 billion won for both DC private manufacturing (PM) and private non-manufacturing (PN) projects. The contract amount of DC PN projects has rapidly increased due to Project Finance Vehicle (PFV) to fund urban developments in Incheon, Busan and other cities.

On the other hand, as for DC projects owned by public agencies, the number of projects owned by government agencies (17 ministries, 5 authorities, 16 administrations, and others) was 88 (42%) in the first

TABLE Ⅳ
SIZE OF CM CONTRACT AMOUNT

Overview of CM Statistics 1997 to 2013 : 3,517 billion won for 2,983 projects										
	PM (Private Manufacturing)		**PN** (Private Non-manufacturing)		**GO** (Government Organization)		LO (Local-government Organization)		**EO** (Et cetera Organization)	
	CM Contract Total Amount	**No. of Projects**	**CM Contract Total Amount**	**No. of Projects**	**CM Contract Total Amount**	**No. of Projects**	**CM Contract Total Amount**	**No. of Projects**	**CM Contract Total Amount**	**No. of Projects**
DP	0 billion won	0 contracts	0 billion won	0 contracts	558 billion won	210 contracts	380 billion won	380 contracts	925 billion won	392 contracts
DC	192 billion won	246 contracts	1,150 billion won	1,496 contracts	0 billion won	0 contracts	0 billion won	0 contracts	0 billion won	0 contracts
IP	0 billion won	0 contracts	0 billion won	0 contracts	1 billion won	2 contracts	0 billion won	0 contracts	39 billion won	92 contracts
IC	25 billion won	18 contracts	54 billion won	61 contracts	0 billion won	0 contracts	0 billion won	0 contracts	171 billion won	81 contracts

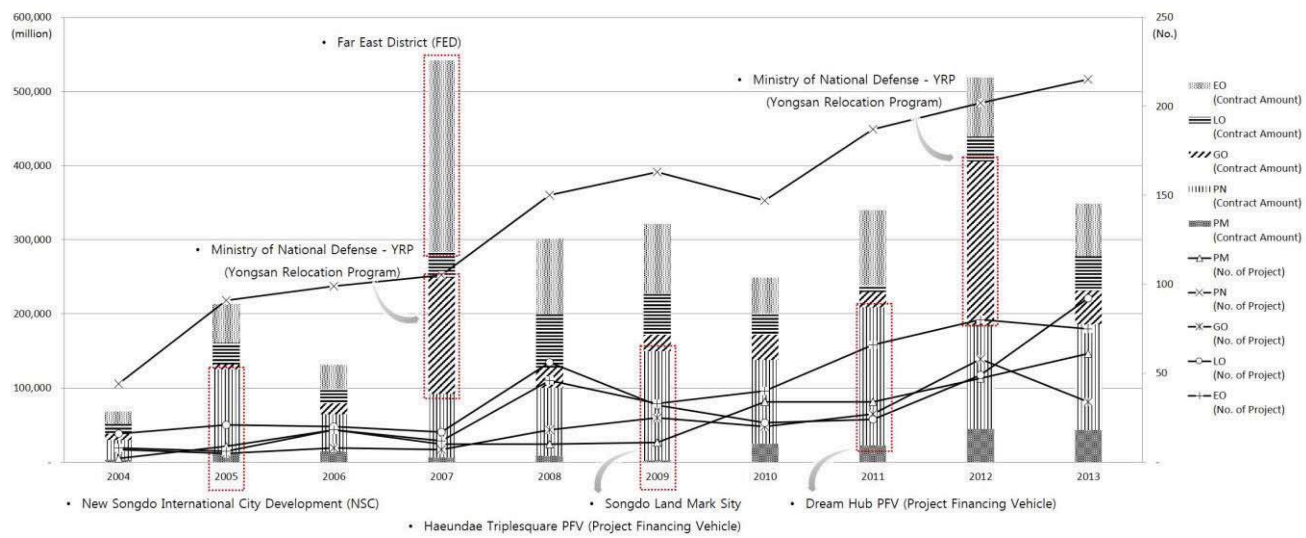

Fig 4. . DOMESTIC-PRIVATE NON MANUFACTURING (PN) : 2004 TO 2013 STATISTICS

contract amount range (1), while the number of projects owned by local governments was 146 (38%) in the second amount range (2). Even though frequency of placing order was lower than the private sector, the average amount of CM project was higher (government agencies: 2.7 billion won, local governments: 1 billion won). Local government CM projects started with building World Cup stadiums in Seoul and Suwon in 1998 to prepare for the 2002 World Cup, while government agency-owned CM projects were applied in earnest in 2004 (previously, only 1 project executed).

In the case of domestic and international CM projects owned by individuals and foreign clients (excluding Yongsan Relocation Program project), the number of contracts awarded between 2010 and 2013 (92 contracts) was 2.6 times more than that in the period between 2006 and 2009, and in the same period, the average contract amount has increased 1.6 times (118.3 billion won).

The analysis revealed that private owners whose average order amount was 0.7 billion won placed more various orders than public owners. Public owners placed similar orders and frequency was less than private owners. Their average order amount was 1.6 billion won, a nearly double of that of private owners.

IV. CONCLUSION

Over the last 18 years, the Korean CM industry has been made an enormous progress, and recently considerable effort is being made to expand its presence in other countries and improve CM technologies. However, there still has been lack of studies that quantitatively and comprehensively analyze the CM industry's status, problems, and future direction. In this sense, this research conducted analysis of time series between 1997 and 2013 for 2,983 results data registered in KISCON in terms of CM market, CM contract size, and CM owner type.

The analysis results show the CM industry is quite promising due to market and project diversification and CM contracts based on management capacity improvement following the Korean CM companies' entering into overseas markets including Asia, Africa, and Europe. Still, 90% of the accumulated contract amount is from domestic public and private projects, which means the CM industry heavily relies on domestic projects. But the current condition is not so negative because it is still ideal if it seeks for strategies to expand its presence in overseas private CM market based on comprehensive business management capabilities improved by rich experience of domestic projects. This research will serve as a valuable basic reference to identify the CM industry's current conditions and major issues and make future contract winning strategies.

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REFERENCES

[1] Jung, Y., Shin, D. W., Kang, S. H., and Kim, N. J. (2014). "Growth Model for Korean CM Firms based on 2012 Statistics." Korean Journal of Construction Engineering and Management, 15(6), KICEM, pp. 92~104.

[2] Jung, Y., Woo, S., Park, J., Kang, S. H., Lee, Y. and Lee, B. N. (2004). "Evaluation of the Owners' CM Functions." Korean Journal of Construction Engineering and Management, 5(3), KICEM, pp. 128~136.

[3] Kang, S. H., Jung, Y., Kim, N. J., and Shin, D. W. (2014). "Policies and Tasks for Improving Korean CM Industry." Korean Journal of Construction Engineering and Management, 15(5), KICEM, pp. 71~81.

[4] Ministry of Land, Infrastructure and Transport (MOLIT) (2010). Strategies for Construction and CM Firms to East Asia Construction Market. MOLIT Research Report, Korea, 2010-12.

[5] Oh. S. W., Han. S. W. (2012). "CM Market Revitalization Strategies in Domestic Public Construction Projects based on Questionaries and Delphi Techniques", Korean Journal of Construction Engineering and Management, 13(3), KICEM, pp. 131~142.