

Suggesting Direction on the Construction Technology Development of Cost Saving Housing for the Underprivileged -Focusing on the Apartment Housing-

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ABSTRACT: Recently, Korean cities have many problems such as decreasing the number of population and declining the number of buildings and infrastructure quality. These problems are regarded as the urban renaissance in this study. As the respects of issues, this study should show direction on the construction technology development of cost saving housing for the underprivileged relation to the region of improving housing surroundings.

Keywords: Urban Renaissance, Method of Saving Construction Cost, Technical Development, the Underprivileged, Construction Management Method

1. INTRODUCTION

1.1 Research Backgrounds and Purpose

The housing situation in Korea poses a growing problem because of the relatively slow increase of supply against the rapidly rising demand for new houses and the larger cities of the republic of Korea, including metropolitan and urban area, have been rapidly growing by reason that acceleration of urbanization from the movement of population in urban areas(The Ministry of

Land, Transport and Maritime Affairs, 2002).

Especially, the urban development is a topic of construction within situation of times, so it called "high economic growth period" for the past 50 years in urban areas.

However, since the second half of 20th century, the results were shown lots of the problems which leading up the Global Environmental Issue, the Doughnut Phenomenon, and the Urban Scale Dispersion (Lee jeong-hyung, 2007).

It was found from the result that lots of problems which raising social cost, damaging natural resources, and destroying landscape of urban area have been appeared (Hyung, shi-hyung, 2006). What is more, the level of urban arrangement was staying on physical step yet, it didn't consider enough economical and social regeneration.

Therefore, the purpose of this study should suggest the construction technology development of cost saving housing suited for characteristic and needs of the underprivileged on the basis of project techniques and engineering technology among lots of technologies which including policy, system, and techniques in the specialized field.

As the purpose of this study is concerned, it is necessary to discuss the direction on the construction technology development of cost saving housing in detail.

1.2 Scope and Method of the Research

We are concerned with scope and method of the research in this chapter. The final goal of this study is to improve, develop both technical development and construction management method through saving cost of construction industry for the underprivileged. The extent of housing type is to define middle and high rise housing, on the basis of the region of improving housing surroundings.

The method of this study is stated the following that. Firstly, as doing investigation of literature and review preliminary study over the last five years, it suggested and classified the key methods which suggesting technical development and construction management method.

Secondly, as analyzing construction cost specifications relation to 12 type apartment housing cases and the Yang-dong, Kwang-ju case which being delivered at the Korea National Housing Corporation, the results clearly shows that three ways of technology development methods which inducing saving construction cost in the whole works stages.

Lastly, we indicated that a final conclusion and the further research method through inspection of feasibility study in view of construction cost, period, and management

method, works method and techniques utilizing the following methodology with consultation of the expert and discussion, investigation of questionnaire in order to review suggesting the key technologies classified by type.

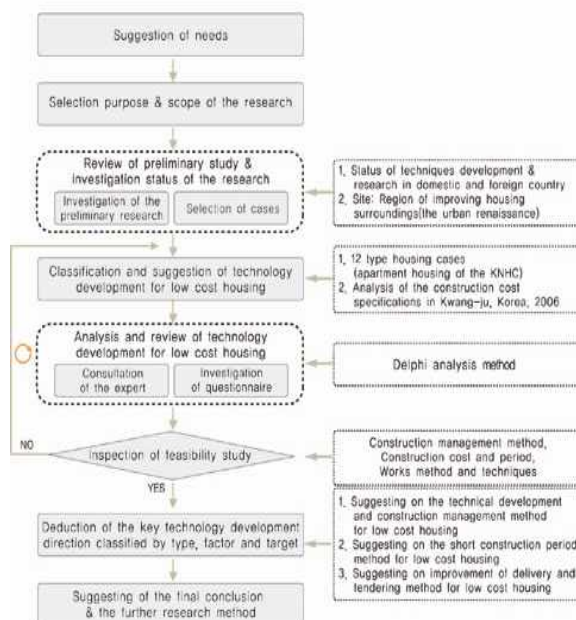


Figure 1: Flow Chart of the Research

2. THEORETICAL CONSIDERATION

2.1 Research Status of Technology Development in domestic and foreign country

The study was investigated, arranged the target of the technical development and construction management method, the short construction period method, and improvement of delivery system and tendering method among others, it would show status of the research, examine the actual condition of technology development by mutually comparing and analyzing situation of the current construction technology for low cost housing.

Currently, seeing as the following table below, the status of technology development in domestic is approximately 60~70% in comparison with advanced countries (USA, EU, JAPAN, CANADA). It mainly has been proceeding in view of the short construction period, construction prime cost, and improvement of productivity.

Table I : Compared with Status of Technology Development in Domestic and Foreign Country

Type of technology	Status of technology development in advanced countries	Status of technology development in domestic
The technical development & construction management method for low cost housing	-JAPAN: develop multiple-joined construction method, safety management, the short construction period, construction prime cost, etc -USA, CANADA: application of a large size system form, high and fast intensity concrete	-KOREA: it's difficult to grasp the whole things(prime cost, period, productivity)
Short construction period for low cost housing	-Construction period (each floor) ▪ USA: 10.5~12.6 day/floor ▪ JAPAN: 15.0~25.7 day/floor	-Construction period(each floor) ▪ KOREA: 29.0~35.0 day/floor ▪ 2.3~3.3 times compared with USA ▪ 1.1~2.3 times compared with JAPAN
Improvement of delivery system and tendering method of low cost housing	-The lowest price tender -The tender separated techniques and price -CM at risk -CM support service method -The design build method -The bridging -The job order contents	-The total cost tender -The specifications tender -The alternative tender -The turnkey tender -The lowest prime tender

✱ **Source of data:** The 2nd Research Report of the Urban Renaissance, 2008

2.2 Definition of the Underprivileged¹

A broad sense of the underprivileged is from the minor group to person who isolated in view of age, sex, physical handicap, social position, and so on. The underprivileged is generally similar to the group of social alienation and the weak.

The concept of the underprivileged is the same as the target of social welfare, consists of the low income group, the old, the handicapped, child, women.

The underprivileged could be classified with the low income group of economical aspects and the social alienation group. The following stated table and diagram below show list and

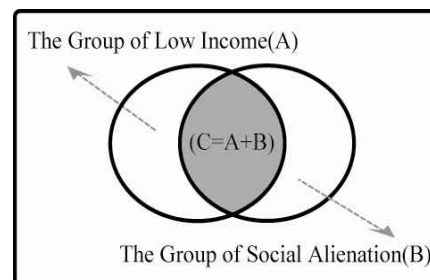
¹ The target of the Underprivileged is the 1st~6th income group whom preferentially required public services by the Road-map Concerning about Supporting Housing Welfare of the Ministry of Land, Transport and Maritime Affairs, and the size of provisional housing area is about 50 and less square meter.

classification of the underprivileged classified by type.

Table II : Road-map Concerning about Supporting Housing Welfare

Level	Keynote	Contents
1st group	The weak group of payment ability	1.rent & purchase with multiple housing 2.supply a small lease housing 3.enlarge support of rental pay
2nd~4th group	The weak group of self- purchase	1.supply a lease housing 2.revitalization of bad housing 3.enlarge support of lease pay
5th~6th group	The group of self-purchase ability when government support	1.supply low cost small & middle housing 2.enforce support of purchasing housing money
More than 7th group	The group of self-purchase ability by self-effort	1.leave a functional market in the hands 2.support financing

✱ **Source of data:** The Ministry of Land, Transport and Maritime Affairs, 2003

**Figure 2: The Concept of the Underprivileged****Table III. The Section of the Underprivileged Classified between Economy and Society**

Type	Economical weak	Social alienation
The group of low income (A)	○	×
The group of social alienation (B)	×	○
The group of low income and social alienation (C)	○	○

3. Urban Renaissance

3.1 Scope and Concept of the Urban Renaissance

The city has been constantly changing according to environmental factor and change of inside conditions around it. Also, it doesn't stopping and stagnating. As depending on whether adaptation about a new environment, the city is developing or declining. On the basis of the city pursue changing and responding desire of itself after creating, it can be justify reconstruction in the broad sense(Noh, chan-hee, 1985).

Therefore, reconstruction of the city is connecting with origin and history around urban. Thus, the Urban Renaissance is a new reconstruction form that result in operating complicated with lots of factor, to be concrete justification, the scope of the Urban Renaissance can be interpreted as following that.

The Urban Renaissance is a strategic activity which physically improves area of declination or low-utilization in view of long-term and concrete vision, consider a sustainable growth of the urban(Ju, kwan-su, 2008).

3.2 Status of the Urban Renaissance Projects in the domestic market

As analyzing status of the Urban Renaissance in domestic market the latest housing development, reconstruction, and environmental maintenance of urban areas generally promote on the center of a large city, and then ratio of apartment housing at tendency of construction industry has been gradually increasing between 2002 and 2006.

Table IV. The Construction Market Scale Classified by type in Domestic

Type	Market scale classified by year				
	2002	2003	2004	2005	2006
Single & Row housing	13,750	9,895	7,961	4,811	5,809
Apartment housing	217,167	266,461	313,216	340,856	332,347
Total	230,917	276,356	321,177	345,667	338,156

※ **Source of data:** 2002, 2003, 2004, 2005, 2006, Construction Industry's Statistical Report, Construction Association of Korea.

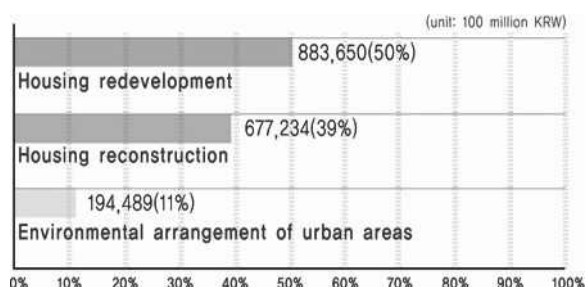


Figure 3: The Scale and Rate of Construction Project Cost Classified by Project Method

When it was given the arrangement expected area of 12 cities through the scale and rate of project cost classified by urban, the scale of the market of construction industry relation to the Urban Renaissance was approximately estimating 175, 000 billion(KRW) as shown below Fig. 4 and table V. As estimating all urban areas, the scale of construction industry market relation to the Urban Renaissance is at least estimating over 200,000 billion (KRW).

As considering size of market classified by urban, seeing the following figure 4, Seoul and the national capital regions were indicated at 113,000 billion (KRW) that 65% of all, and then as considering size of market classified by project method, seeing the following figure 4., the housing redevelopment project was shown 88,000 billion (KRW) that 50% of all.

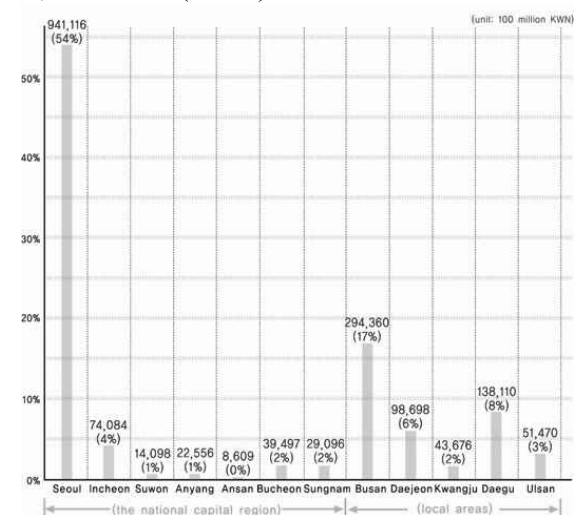


Figure 4: The Scale and Rate of Construction Project Cost Classified by 12 cities

Moreover, as predicting the size of market relation to low cost housing for the underprivileged utilizing the construction technology of low cost

housing in the urban regeneration area, the scale of market is approximately estimating 107, 000 billion(KRW); including portion of housing redevelopment and environmental maintenance of urban except of housing reconstruction.

Table V. Analyzing the Size of Construction Industry Market Relation to the Urban Renaissance in Local Areas

Local areas	Area(ha)	Area(m ²)	Cost per area (thousand won/m ²)	Total project cost (100 million KRW)
Seoul	2,505.80	25,058,000	3,756	941,115.5
Pusan	1,962.40	19,624,000	1,500	294,360.0
Incheon	643.7	6,437,000	1,151	74,083.5
Daegu	1,173.00	11,730,000	1,177	138,110.3
Kwangju	449	4,490,000	973	43,676.3
Daejeon	1,042.00	10,420,000	947	98,698.2
Ulsan	514.7	5,147,000	1,000	51,470.0
Seongnam	293.9	2,939,000	990	29,096.1
Bucheon	399	3,990,000	990	39,496.8
Anyang	145.3	1,453,000	1,552	22,556.1
Suwon	142.4	1,424,000	990	14,097.6
Ansan	95.65	956,500	900	8,608.5
Total	9,366.85	93,668,500	15,926	1,755,369

3.3 Prospect and prediction of the Urban Renaissance Projects in the domestic market

As predicting the size of market relation to the Urban Renaissances, the size of market on middle, long-term housing construction industry and the Urban Renaissances in domestic appears in figure 5 and is the results which put together increase of housing stock, status of predict population, change of the rate in population per house, status of construction and destruction housing.

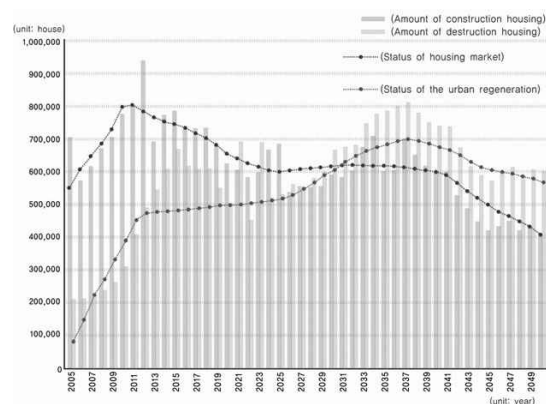


Figure 5: Comparison & Prediction about the Size of market on Middle, Long-term Housing Construction Industry and the Urban Renaissance in Domestic

4. The technology Development of the Cost Saving Housing

4.1 Outline of Technology of the Cost Saving Housing

The construction technology of low cost housing is the development technology for saving integrated cost and the multiple technology put to practical use through the whole works stages, including supply, plan, demand, control, operation in order to the underprivileged possess, lease, and utilize housing dwelling in bad housing sector.

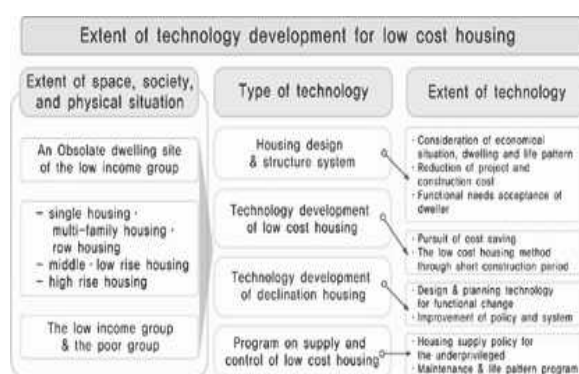


Figure 6: Extent of Technology Development for Low Cost Housing

The following figure shows vision of technology development of low cost housing from goal of that. The social goal consists of possession and lease, sustainable maintenance, and consideration of settlement rate. Finally, it follows from what has been said thus for that vision of technology development is ensure a rest housing and carrying on sustainable life for the low income group through social goal and technology development.

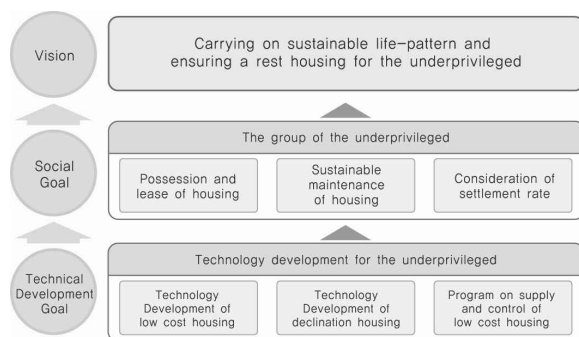


Figure 7: Vision of the Technology Development in Low Cost Housing

Progressing direction of technology development in low cost housing is to purpose improving arrangement works of the further dwelling site by offering the method of utilizing the technology development through improve, develop some of problems relation to arrangement works of the existing dwelling site.

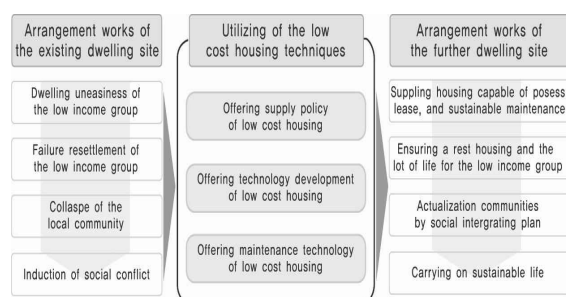


Figure 8: Progressing Direction of Technology Development in Low Cost Housing

4.2 Selection of Case & Analyzing the Target

In this study, standard of selection case study is stated the following below. Firstly, it selected representative type of 12 cases which were delivered by Korea National Housing Corporation classified by size, height, and scale.

Secondly, it analyzed construction cost specifications of apartment housing case which were delivered at region of improving housing surroundings (the Urban Renaissances) in the Yang-dong, Kwang-ju(2006), Korea.

Finally, it examined the key technology development classified by type, factor in view of construction cost, period, and management method, works method and technique.

4.3 Classification and suggestion of technology development

This study representatively has indicated three methods which being classified the technical development & construction management method, technology development of short construction period, and improvement of delivery system and tendering method on the purpose of construction cost reduction, short construction period, and productivity improvement for the underprivileged.

4.4 Method of technology development in the cost saving housing

From what has been discussed above, the way of development is the following that below.

1. The technical development & construction management method for low cost housing

- Practical use method of system form
- Practical use method of processing and pre-assembling in the reinforcing bar works
- Practical use method of dry underfloor-heating works
- Practical use method of partition & lightweight wall works
- Application of Components & PC method

2. Short construction period for low cost housing

- Minimize of direct cost rising by short construction period
- Form method for saving manpower in the reinforcing bar works
- Method of manpower operation & improvement of structure system
- Suggest enforcement and field curing of framing/finishing works during the winter season
- Package of windows works, application of lightweight wall method

3. Improvement of delivery system and tendering method of low cost housing

- Suggestion of delivery system and tendering method considering housing type, project scale, ranking level of company, ability of implement
- Suggestion of delivery system and tendering method by type of the short construction period & value engineering
- Suggestion of implement method of the technical proposal-based tender
- Suggestion of connecting the technical proposal-based tender, tender type of the short construction period, and construction value engineering method

5. CONCLUSION

In this study, it classified, suggested that construction technology for low cost housing through review of preliminary study

and investigation of the Korea National Housing Corporation cases.

The next stage, according to being indicated construction technology for low cost housing, we firstly analyzed, revised it through consultation of the expert and investigation of questionnaire, and then secondly did inspection of feasibility study with Delphi Analysis Method.

Lastly, we examined the key technology development direction classified by type, factor in view of construction cost, period, and management method, works method and technique.

In conclusion, from what has been discussed above, the following results were obtained: firstly, it should be considered saving the of construction prime cost using housing construction industry. Secondly, it should be propelled combination and package of technology development on the basis of the target which high efficiency of saving prime cost and possibility of applying technology in the whole phases. Besides, it should be raised level of quantitative, qualitative, and reduction of construction cost. As introducing the way of the best suited delivery system and tendering method classified by business type.

So far, we have seen direction of technical development and construction management method for the underprivileged in cost saving housing. The further direction of this study will be indicating actually practical use method relation to cost, quality, and productivity.

From now on, selection of extent applying the target classified by factor, type, and floor will be needed to properly utilize technology development for the underprivileged in saving cost housing.

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