Basic Study on Influence Factors for Defect Repairing Cost of Apartment Building in Korea

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Abstract. Korea’s universalized housing form is mostly composed of apartment housing, in other word apartment. Defect lawsuits have increased according to the social change and demand. The most important thing among various issues on defect lawsuit is defect repairing cost. Accordingly this study reviewed the influence factors on defect lawsuit damages of defect lawsuit for apartment. It was analyzed the regression model of the number of household participated in defect lawsuit, total gross floor area and deposit has the explanatory power of appropriate level. We expect that this study would be helpful to the research of defect lawsuit damages estimation of defect lawsuit and defect repairing cost in the apartment housing of which defect repairing cost deposit is exempted.

Introduction

Korea’s universalized housing form is mostly composed of apartment housing, in other word apartment. Korea’s apartment has enjoyed the great popularity because they are more favorable than existing housing in various aspects which include housing convenience, safety and maintenance costs of residence. Therefore many of Koreans live in apartment now or hope to live in apartment.

But the price of apartment is a little on the expensive side than other housings, the dispute has been accelerated over and due to the luxurious image by the project entity and the increased taste level by partitioned owners [1]. The defect conflicts over apartment have expanded until the legal proceedings. The issues of defective proceeding are roughly divided into two. One is the legal issue which includes responsibility bearing, liability period while the other is the technological issue which includes the definition of defect, repairing method and repairing cost [2]. The dispute between the parties is fierce over these various issues in the defect lawsuit. But the ultimate purpose of defect lawsuit lies on the calculation of reasonable defect repairing cost.

The defect lawsuit damages, the conclusion of defect lawsuit, is considered to be the defect repairing cost in the view of defect lawsuit. An appraiser shall research whether the defect repairing is required, which level repairing is appropriate in the defect lawsuit. And the justice department finalizes the defect lawsuit damages by adding or deducting the amount based on such a result at the appropriate level. But various influence factors influence to the calculation of defect lawsuit damages but the application level on each factor of appraisers and justice departments is very wide and the objective criteria is far from enough in the actual environment.

Purpose

As a basic study on the factors to influence the defect lawsuit damages of defect lawsuit, this study reviewed the influence factors which have been known as important factors related to defect lawsuit so far but their relations with defect lawsuit damages have not been actually identified. So we would like to contribute the calculation of reasonable defect repairing cost and the response against defect lawsuit through this.

Scope and Method

The target of this study is apartment housing. Korean architecture Act defines the housing of which floor is over five as apartment. This study targeted the basic information of relevant apartment which
includes the number of household participated in defect lawsuit, the number of months passed, total gross floor area and deposit as influence factors on defect lawsuit damages. We conducted the mutual correlation analysis between these, thoroughly researched the correlation of related influence factors with defect lawsuit damages through regression Analysis.

Meanwhile the cases of defect lawsuit are divided into the third year lawsuit apartment, the tenth year lawsuit apartment generally based on the time of proceeding start, they were also divided into lot-solid apartment or rental apartment. This study targeted 48 cases of lot-solid apartment which 3 years have passed.

**Literature Review**

**Defect Repairing Cost in Apartment Building**

The concept of defect repairing cost means the total cost which has been used for the actual defect repair. We can consider such a defect repairing cost by dividing into following 3 kinds.

First, the defective occurred before the apartment completion, at the stage of move in are relatively fast repaired by building company. In this case the defect repairing cost are self-estimated and self-repaired by the relevant building company. But they don’t disclose the breakdown of estimation but just focus on the action of defective repairing so the defect repairing cost can’t be identified.

Second, the defects occur due to the use of residents, the poor maintenance of managing entity and natural damage when several years have passed after move at the stage of use. If there is Liability Period, the building company which has the liability of repair, normally repairs the defect after self-estimation. In this case it is hard to identify cost related information as they just focus on the defect repairing not cost.

Third, the situation gets rather different when unsatisfied partitioned owners file proceedings even if defect repair is provided as above 2 cases. The partitioned owners submit to the judgment department after calculating the defect cost through separate inspection. The business entity and the building company argue or insist that they executed the liability of defective repair based on the historical document of defective repairs which have been conducted so far. To verify the opinions of both, the judgment department appoints the appraiser (the technician who has a professional license such as architect or engineer with related work experience), conducts the investigation of relevant apartment and calculates the cost. So it is easier to identify the defect repairing cost than above two cases.

The literature study (Table 1) falls short of the research and analysis of defect repairing cost before move in, during move in and use in actual situation. Also the research on defect repairing cost at the stage of proceeding is short as it is hard to find the cases of defect lawsuits. The precedent studies just stay in the stage to analyze the defect repairing cost of special process like crack repair and painting work [3, 4].

**Table 1. Summary of literature study about defect repairing cost.**

| Researcher       | Study content                                                                 |
|------------------|-------------------------------------------------------------------------------|
| Kang et al(2010) | Researched the influence on litigation expense, deposit, proceeding cost and proceeding term of apartment defective proceeding through correlation and regression analysis |
| Kim et al(2011)  | Compared the defect repairing cost according to whether to admit crack allowance, and repair method, coating scope in the apartment defective proceeding |

**Influence Factors of Defect Repairing Cost**

This study named the number of households participated in proceeding by each event, the numbers of months passed from the construction completion to the starting of defect lawsuit, total gross floor area which is the sum of floor area of all the household participated in defect lawsuit and the defective
repair deposit calculated at the time of construction as the factors which can influence the defect lawsuit damages in the defect lawsuit. Because these factors are representative among the criteria which can estimate the scale of defect lawsuit and they are composed of the information which people can know even before proceedings are initiated, they can be utilized to estimate the defect lawsuit damages before defect lawsuit.

Case Study of Defect Lawsuit

Outline

This study conducted the correlation analysis and the regression analysis in order to analyze the influence factors of defect lawsuit damages targeting 48 cases of defect lawsuit. The correlation analysis reviewed the mutual correlation of defect lawsuit damages, the number of household participated in defect lawsuit, number of months passed, total gross floor area and deposit. The regression analysis of which dependent variable is the defect lawsuit damages was conducted for factors with deep correlation. These analyses utilized PASW Statistics 18.

Correlation Analysis

The correlation analysis reviewed the mutual correlation among defect lawsuit damages, the number of household participated in defect lawsuit, number of months passed, total gross floor area and deposit. As a result of correlation analysis (Table 2), there exist correlations among defect lawsuit damages, the number of household participated in defect lawsuit, total gross floor area and deposit. Especially it was found that the defect lawsuit damages are very closely correlated with total gross floor area and deposit. On the contrary it showed that the number of months passed are not related with other influence factors so it was excluded in the next regression analysis.

Table 2. Result of correlation analysis.

|                      | Defect lawsuit damages | Number of households | Total gross floor area | Number of month passed | Security deposit |
|----------------------|------------------------|----------------------|------------------------|------------------------|-----------------|
| Defect lawsuit damages | Pearson correlation coefficient | 1 | .528** | .836** | .062 | .816** |
|                      | P-value                | .000 | .000 | .674 | .000 |
|                      | N                      | 48 | 48 | 48 | 48 |
| Number of households | Pearson correlation coefficient | .528** | 1 | .574** | .011 | .512** |
|                      | P-value                | .000 | .000 | .943 | .000 |
|                      | N                      | 48 | 48 | 48 | 48 |
| Total gross floor area | Pearson correlation coefficient | .836** | .574** | 1 | .254 | .915** |
|                      | P-value                | .000 | .000 | .081 | .000 |
|                      | N                      | 48 | 48 | 48 | 48 |
| Number of month passed | Pearson correlation coefficient | .062 | .011 | .254 | 1 | .152 |
|                      | P-value                | .674 | .943 | .081 | .303 |
|                      | N                      | 48 | 48 | 48 | 48 |
| Security deposit     | Pearson correlation coefficient | .816** | .512** | .915** | .152 | 1 |
|                      | P-value                | .000 | .000 | .000 | .303 |
|                      | N                      | 48 | 48 | 48 | 48 |
Regression Analysis

The regression analysis was conducted by setting defect lawsuit damages as dependent variable while setting the number of household participated in defect lawsuit, total gross floor area and deposit as dependent variables. We reviewed the regression model which used 1, 2 and 3 dependent variables respectively.

As a result of regression analysis (Table 3), it showed that total gross floor area (Model 1-2) was the most influential to the defect lawsuit damages while the number of household participated in defect lawsuit (Model 1-1) is the least influential in the regression model with 1 independent variable. The explanation power was the highest when total gross floor area and deposit (Model 2-3) were utilized in the regression model with 2 independent factors. Meanwhile the explanation power of regression model (Model 3-1) which used 3 independent variables was the highest of 71.9%.

Table 3. Result of regression analysis.

| Model | Influence factor | Coefficient determination($R^2$) | Ranking |
|-------|-----------------|----------------------------------|---------|
|       | Number of households | Total gross floor area | Security deposit |         |
| 1-1   | ○               | -                               | -        | 27.9%   | 7       |
| 1-2   | -               | ○                               | -        | 69.9%   | 4       |
| 1-3   | -               | -                               | ○        | 66.6%   | 6       |
| 2-1   | ○               | ○                               | -        | 70.3%   | 3       |
| 2-2   | ○               | -                               | ○        | 68.2%   | 5       |
| 2-3   | -               | ○                               | ○        | 71.5%   | 2       |
| 3-1   | ○               | ○                               | ○        | 71.9%   | 1       |

Results and Implication

We organized the result and implications which analyzed the influence factors on defect lawsuit damages in the apartment defect lawsuit as follows.

First, it showed not only the number of household participated in defect lawsuit, total gross floor area and deposit had the correlation, but also they had high explanation power as regression model. Especially the regression model (Model 3-1) utilizing all the variables has the highest explanation power, it is expected that it can be utilized for the estimation of defect lawsuit damages even before the lawsuit.

Second, Model 3-1 and Model 2-3. Model 2-1, Model 1-2 had no significant difference in explanation power. Therefore it is considered utilizing these models will be fully useful in some cases.

Third, because Model 1-2 and Model 2-1 have no deposit information, they can be utilized for the estimation of defect repairing cost and defect lawsuit damages of apartment of which the defective repair deposit is exempted. But the separate analysis shall be conducted for the verification targeting the apartment of which the defective repair deposit is exempted.

Conclusion

This study conducted the review of 4 influence factors on the defect lawsuit damages of apartment defect lawsuit which has been issued in Korean society. As a result, it showed the correlation exists among the number of household participated in defect lawsuit, total gross floor area and deposit excluding the number of months passed. Also it was analyzed the regression model of the number of household participated in defect lawsuit, total gross floor area and deposit has the explanation power of the appropriate level on the defect lawsuit damages. It is expected that utilizing the result of this study would be helpful to the research in which the defect lawsuit damages of defect lawsuit or defect
repairing cost is estimated from the apartment of which the defective repair deposit is exempted, or
the research to estimate the defect lawsuit damages even before proceeding.

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References

[1] J. Park, D. Seo, Development of standard work process model for defect consulting on Korea
apartment housing, International Journal of Applied Engineering Research. 9 (2014) 18167-18174.

[2] J. Park, D. Seo, J. Choi, O. Kim, K. Park, J. Jo, Analysis on legal issue of lawsuits and subjective
judgment on defects in apartment building, Journal of the Korea Institute of Building Construction.
v.12 n.1 (2012) 42-53.

[3] B. Kim, J. Park, J. Choi, D. Seo, O. Kim, Comparative analysis on repairing cost of lawsuit on
concrete crack defect in apartment building, Korean Journal of Construction Engineering and
Management. 64 (2011) 142-150.

[4] Y. Kang, B. Kim, J. Park, J. Choi, D. Seo, O. Kim, Regression analysis on the dispute cost
property in apartment housing claims, Proceedings of Korea Institute of Building Construction. 18
(2010) 225-228.