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– 한옥주택 건축공사비를 중심으로 –

Material Cost Variations depending on the Species and Manufacturing Process of Wood in Hanok Buildings

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Though the effort of central and local government for promoting Hanok, Hanok in the housing market is not such promoted due to common understanding on generally higher construction cost of Hanok than one of a regular single-detached house. This relatively high construction cost of Hanok, however, is not the only barrier to successful Hanok promotion. When an individual tries to build a Hanok, he/she is likely to be advised from an expert on the total construction cost that is estimated in accordance with a unit cost per Pyeong(i.e., 3.3㎡), considering with the scale of the Hanok. That individual, however, is highly likely not to be informed on why the construction cost of Hanok should be such higher than one of other housing types, which is not a transparent nor reasonable situation. It is necessary, therefore, to prepare a standard to estimate the construction cost of Hanok rather than asking unconditional construction cost reduction to Hanok industry. The standard should correspond with various needs(e.g., forms, materials, functions, etc.) of consumers of Hanok housing market and should be transparent and reasonable.

Following up the research result ‘Material Cost Variations depending on the Forms and Dimensions of Timber Frame in Hanok Buildings(2013)’ of the Architecture and Urban Research Institute, this study calculated the wood material cost in accordance with the wood species and wooden sawing for Hanok construction. This study also analyzed changes of the Hanok construction unit cost in two ways in order to improve transparency in the wood material cost, to find the reasonable measure, and to propose the alternative that the Hanok housing market consumers’ budget and

preference are considered.

The construction cost estimates that were calculated by traditional and modern Hanok construction processes were compared and analyzed for the standard Hanok housing models the Hanok Technology Development Research proposed. In contrast to common guess that traditional Hanok construction cost would be higher than modern one, this study found that the modern Hanok construction was costed 5 million KRW more than traditional Hanok construction. Such higher construction cost for modern Hanok was caused by additional construction costs for thermal insulators, system windows, etc. that were not applied to traditional Hanok but were needed in modern houses.

This study also analyzed the carpentry works cost that generally accounts for around 40% of the total construction cost of Hanok. The carpentry works cost consists of material and labor costs in general, and the labor cost proportionally follows the material cost. In this reason this study focused on the material cost and examined unit cost changes of the wood material cost in accordance with the wood species and wooden sawing. Calculations of the total wood material cost were simulated for such two different Hanok models as the 3 Ryangga 3 Kan(間) gable roof Hanok housing and the 5 Ryangga 4 Kan(間) hipped-and-gable roof Hanok housing in accordance with the wood species and wooden sawing.

The wood material cost varies in accordance with the wood species and wooden sawing, and the various wood material costs are investigated and collected for simulating unit cost changes of the wood material cost. The wooden sawing are generally distinguished into flat grain, edge grain, and end grain sawings; however, these are for producing planks not for wooden materials of Hanok. When a wood log is sawn for Hanok construction, instead, how many wooden materials can be produced from one unsawn wood log is more important. The total number of wooden materials from one unsawn wood log is depended on the diameter of wood species. One unsawn pine tree log is highly likely to produce one wooden material for Hanok

construction, and one unsawn Douglas-per log that has a wider diameter than usual pine trees is likely to produce more than one wooden materials. In order to resist common bending stresses, the engineered wood, or the composite wood, is produced by layering to be crisscross of growth rings of each flat grained plank.

The cost of raw logs according by the wood species is little higher for domestic pine trees than imported Douglas-per; however, the cost of sawed domestic pine trees is much higher than the one of sawed imported Douglas-per. This cost difference in sawed woods is caused by difference of wood loss in sawing processes. One pine tree generally produces only one wooden material due to its small diameter, comparing to the Douglas-per that can produce more than one wooden materials from one Douglas-per.

This study simulated unit cost changes in accordance with the wood species and wooden sawing based on two scenarios. The first scenario of unit cost change simulation focused on improving the structural function of Hanok. In this scenario, the structural-use engineered wood was used for main structural materials(i.e., the column, purlin, and beam) of a Hanok, and the pine tree or Douglas-per was used for other materials of the Hanok. The second scenario of unit cost change simulation focused on the aesthetic function of Hanok. In this scenario, the pine tree was used for the column, beam, and finishing material, and the Douglas-per was used for other materials of the Hanok. This study also analyzed the unit cost change by comparing a case that only pine tree species were used for Hanok construction with a case that only Douglas-per species were used for Hanok construction. Results of this study proposed alternatives that enable a Hanok owner to reasonably choose wood material costs for Hanok construction and that reflect his/her preference between structural function and aesthetic function of Hanok.

This study has limitations in simulation scenarios that were not various to analyze much diverse unit cost changes of Hanok construction. However, calculation results on the total quantity of woods by dimensions of Hanok materials and on the