Formulation of Value Engineering Process for New-Hanok Village Evaluation

Jong-Il Park[1], Mihyang Lee[2] and Seung-Hoon Han[3]

***Abstract*—** This study aims to determine the factors to assess the habitability of the modernized Korean traditional housing complex called New-Hanok Village and examine evaluation methods for its components in aspects of the urban planning. To determine the specificity of New-Hanok Village, it is necessary to assess major factors towards the habitability such as Feng-Shui and Yin-Yang. Five design elements of contemporary Hanok residential complex and their characteristics have been investigated to respond to needs of modern people with defining assessment factors derived from the VE (Value Engineering) operation by the evaluation system for the habitability. Through this process, the value of the New-Hanok Village could be settled and its data could be classified. In addition, it would be possible that designers can make decisions quickly by offering necessary plans and element details, while builders would be able to reduce cost and shorten construction period by the whole VE process.

***Keywords*—**Value Engineering, New-Hanok Village, Housing Planning Index, Habitability Evaluation System

I. Introduction

RECENTLY, Korean traditional residence called Hanok is being taken for great attentions with many advantages in aspect of the beauty, the environmental sustainability, its eco-friendliness, and so on. Because of those reasons, Korean government is planning a few national projects to supply demands of users. Nevertheless, Hanok construction is not yet systematic, since its building process tends to depend on constructers' experiences and old customs. So, it is necessary to implement objective databases and standards for value assessment to make decision easily during the design and construction processes.

In this paper, we study the process of deriving the assessment factor to judge the value of the Hanok Village. Through the procedure, a database for value evaluation could be constructed, and designers and constructers may use it in case preliminary planning needs changes, quantity of construction materials are required to be exactly expected, any sudden decision-making should be performed, and so on. The construction period and cost can certainly be reduced by taking alternative decisions in timely manner.

VE in the design process may offer high possibility to make better alternative designs and can accept change of other things, because the final design and the whole contents of the project are not yet decided. It is assumed that VE in the design stage is more effective and has possibility to reduce cost than the construction phase.

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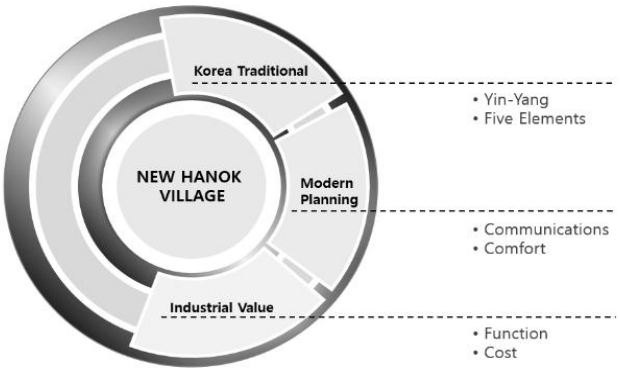

Fig. 1 Process for deriving performance factors

II. Concept of Value Engineering

A. Research Background

VE is a systematic method to improve the 'value' of goods or products and services by using an examination of function. Value, as defined, is the ratio of function to cost. Value can therefore be increased by either improving the function or reducing the cost. It is a primary tenet of value engineering that basic functions be preserved and not be reduced as a consequence of pursuing value improvements.

In architecture, VE process consists of pre-study phase, analysis phase, and implementation phase. Pre-study phase is a step that task-performer receives a project and arranges the information for the next step. On analysis phase, VE information decided in the previous step is used to make alternatives by using systematic processes and application methods, and evaluations are proceeded after that. Implementation phase is carried out by establishing a detailed plan that contents generated in the previous step are to be applied to design and systematic decision-making.

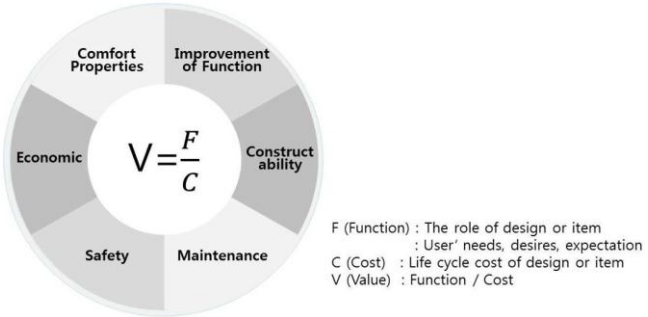

Fig. 2 Concept of VE (Value Engineering)

Information acquired from VE analyses is accumulated and can be used for other projects using VE process in the future. VE in the design area, one of the value engineering scopes, is performed by experts to check design contents especially about economic feasibility and validity on the actual field with functional and alternative indexes.

In sum, VE toward architectural design is consecutively carried out through preliminary planning, design implementation and alteration steps. Ultimately, the purpose of design VE pursues improvement of project value and it needs organized efforts in aspects of cost and time, and other qualitative points of view as well.

B. Effect of Value Engineering Process

Design value assessment is one of VE processes for architectural projects. In this step, a digital spatial model for rating qualities is normally made by 3D tool and it helps expert find further necessary information and details for the design process. 3D models also enable expert to examine designs thoroughly and manage a field of construction and maintenance as the following businesses.

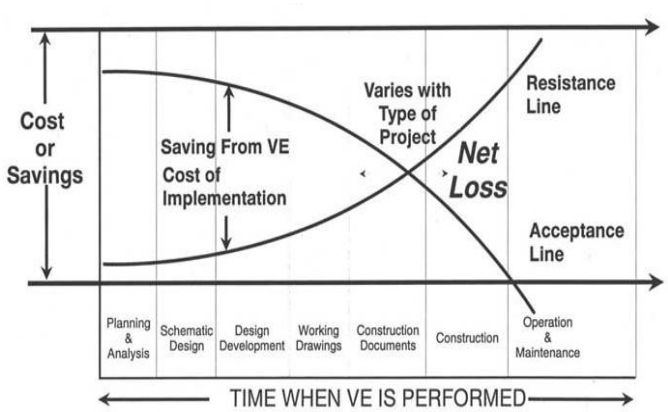

Fig. 3 Effect of VE

For example, Department of Transportation in the United States of America has applied a variety of design VE projects, and they includes 282 SOC (Social Overhead Capital) projects in 1996 with the subsidies by U.S. government and 1083 policy suggestions, and it counts 4 VE suggestions per project in average. Before the design VE, the presumed cost was 6.2 billion and 12 million dollars, but after the design VE, it was significantly decreased to 5.6 billion and 368 million dollars. Finally, the cost could be saved for 10%.

C. Intelligent VE Process Improvements

VE in the design process may offer high possibility to make better alternative designs and can accept change of other things, because the final design and the whole contents of the project are not yet decided. It is assumed that VE in the design stage is more effective and has possibility to reduce cost than the construction phase.

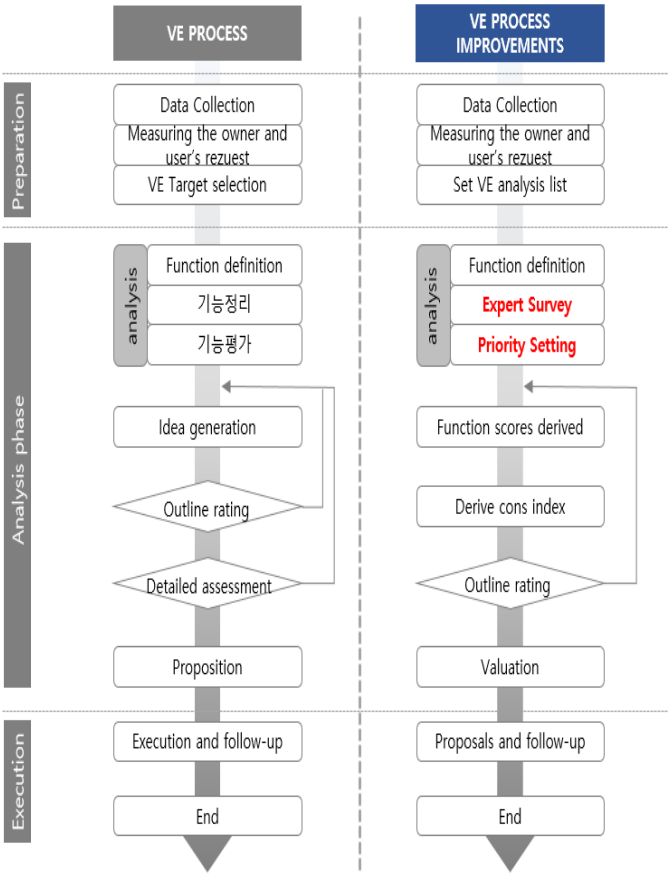

Fig. 4 Improvements intelligent VE process

III. Characteristics of New-Hanok

Hanok have traditionally been regarded as a somewhat inconvenient place to live when reviewed relatively to the value of the modern residence. There have been a few simple methods to improve Hanok, for instance, changing its materials or designing interior space with modern style. But it is difficult to clearly define the type of modernized Hanok, called New-Hanok, because many different perceptions about its value exist. Therefore, it is necessary to set the definition of New-Hanok by examining present studies and it will also help define New-Hanok Village. Finally, those definitions could be set as the following:

New-Hanok has main structure, such as columns, beams, made of wood and traditional roof system called Gi-wa. Those are followed by required elements of the traditional Hanok. Proximal ends of its facade could be modernized and the

interior space could also utilize modern techniques and equipment.

New-Hanok Village fulfilled in a certain site contains more than 10 units a section in its overall area and accompanying landscape that can be harmonized in terms of modern life and spatial combination as well.

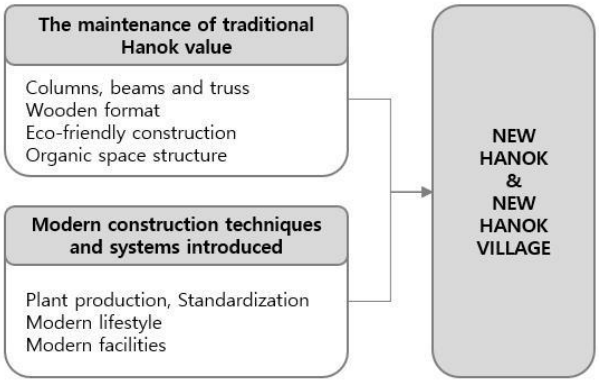

Fig. 5 Definition of New-Hanok and New-Hanok Village

IV. Habitability Factors for New-Hanok Village

To composite a complete list for critical elements of New-Hanok village, it is necessary to set up an index based on very diverse elements of the housing complex and its neighborhood.

TABLE I
EVALUATION ELEMENTS FOR HABITABILITY OF NEW-HANOK

Purpose	Category	Components
Valuation of New-Hanok Village	Spatial structure and land use	Utilizing natural terrain
		Climate control
		Open space
	Placement and size of the household	Placement of the household
		Life style
	Road, streets and transportation system	Roads, parking plan
		Pedestrian, bicycle paths
	Landscape and environment	Landscape planning
		Green space
		Public design
	Public spaces and facilities	Sustainable environment
		Community space
		Citizen participation system
	Inheritance of tradition & locality	Formative value of Hanok
		The material value of the Hanok
		Characteristics of the local

It was required to define values reclassified by the planning principles of the existing traditional Hanok Village and a pilot New-Hanok as the formal framework of the existing town planning related to the process for determining a new evaluation index as follows:

1) Analysis framework for modern residential complex:

District planning guidelines, urban planning guidelines, environmentally-friendly block detached to house, paper composition skills, sustainable new urban framework decision of the classification system by analyzing and planning standards etc.

2) Element Analysis for traditional Korean village planning

Existing planning elements of Korean traditional village derived from a few folk towns originally reserved and reconfigured for modern reconfiguration

3) Element analysis for new-Hanok town planning

Current work of New-Hanok town planning factors in progress and planning principles in the study of Hanok Village that recently built up in Korea

4) Component classification and reorganization

These criteria follow previous steps to determine the New-Hanok town evaluation factors for the future.

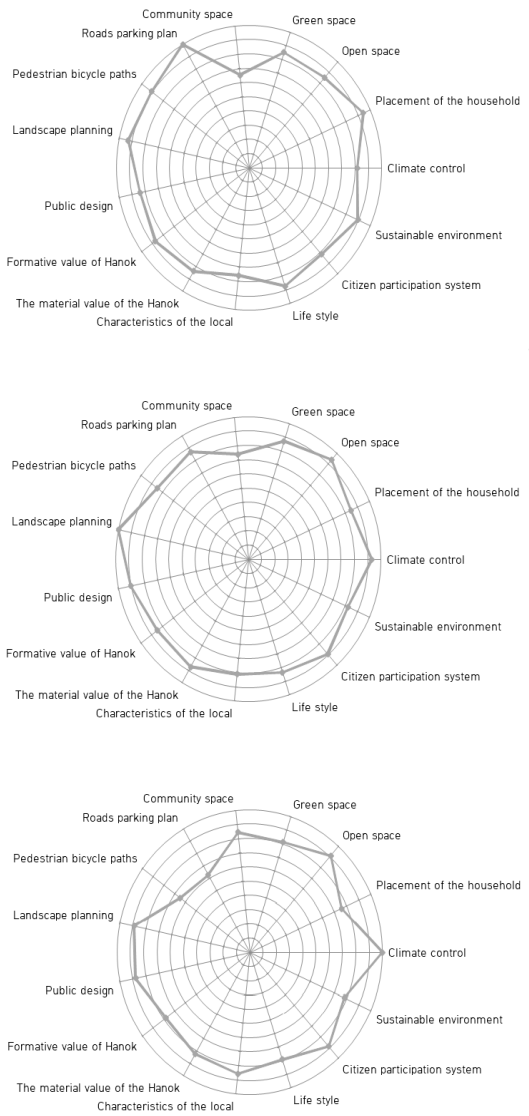

Fig. 6 Survey Results

V. Performance of VE Process for New-Hanok Village

A. Completed Questionnaire

Created questionnaire based on the above factors were derived. Total of sixteen items using a Likert scale are

calculated for each element in priority and could be set. It occupies an important position in the higher value of those elements for New-Hanok Town evaluation. In addition, the questionnaire is classified into three types by location of New-Hanok village built; urban, suburban-type, and rural.

A total of forty five people have participated in survey researches; they include twenty five people of national and public university researchers as well as associated professors, ten patients, and ten working professionals.

B. Comprehensive Survey Results

The survey has been processed and obtained data have been analyzed to get the results. A total of forty five questions are divided into value and type sets and then derive the parent element to take the average data set.

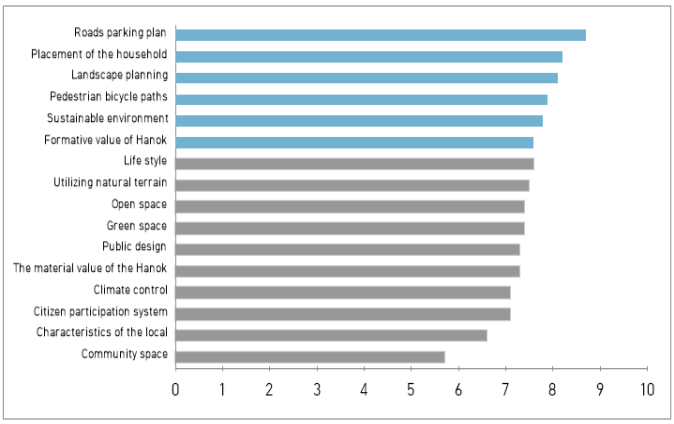

Fig. 7 Degree of importance from elements of urban New-Hanok

In the case of urban New-Hanok town appeared in 'Road and Parking Plan,' the most significant factor takes a 8.7 point and get placement for the household, landscape planning, pedestrian and bike paths, sustainable environment, with formative values of Hanok. It can be seen that the narrow, high land prices in Korea appeared to reflect the urban context, rather than practical, cost-effective parts are more sensitive than the community among residents.

Suburban New-Hanok Town from 'utilizing natural terrain' shows the highest point (8.7); followed by landscape planning, open space, climate control, public design, and citizen participation system in order. The characteristics of the plan look close to the rural type rather than the urban-style. But in overall, it can be seen that the advantages of both urban and rural are about to gain.

In the case of rural New-Hanok town also utilizes the natural terrain and has taken the highest place with a 9.5 point; climate control, open space, landscape planning, citizen participation system, public design are followed in order. Contrary to urban has focused on large land and beautiful natural scenery.

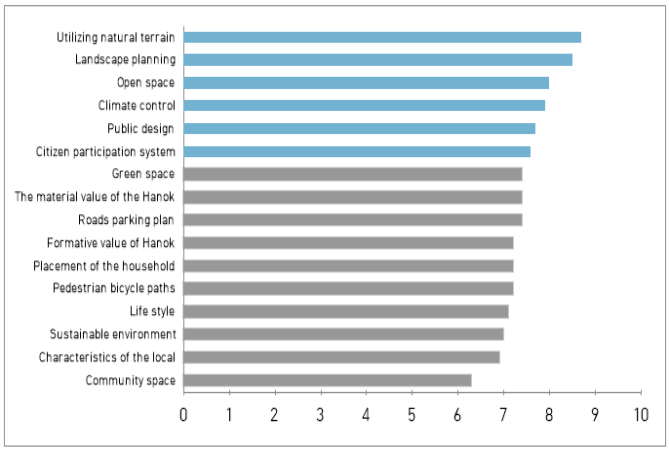

Fig. 8 Degree of importance from elements of suburban New-Hanok

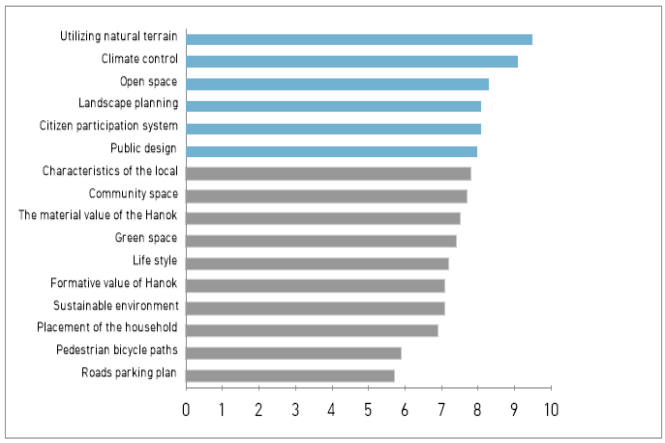

Fig. 9 Degree of importance from elements of rural New-Hanok

TABLE II
THE MAIN CONSIDERATION OF THE REGIONAL NEW-HANOK

Purpose	Category	Components
Valuation of New-Hanok Village	Urban	Roads, parking plan
		Placement of the household
		Landscape planning
		Pedestrian, bicycle paths
		Sustainable environment
		Formative value of Hanok
	Suburban	Utilizing natural terrain
		Landscape planning
		Open space
		Climate control
		Public design
		Citizen participation system
	Rural	Utilizing natural terrain
		Climate control
		Open space
		Landscape planning
		Citizen participation system
		Public design

VI. Conclusion

The interest of the general public about the Hanok is higher than ever, and political support and social demands are being increased dramatically. To response to those requests, New-Hanok Village planing should be done systematically and more efficiently. From this point of view, configuring assessment criteria for New-Hanok Village equipped with a valid system will possibly save money and time from design and construction stages to the maintain phase.

For this study, three steps were performed to suggest evaluation factors for Hanok Village. The first step was to analyze previous studies. Examining previous studies about the existing Hanok Village and its subsystem could be derived. The second step was making a classification system. The classification system has been based on analysis of design standard for Hanok Village. The final step was adaptation of classification system to subsystem. In this step, subsystem factors are classified by six standard categories: Spatial structure and land use, Placement and size of the household, Road, streets and transportation system, Landscape and environment, Public spaces and facilities, and Inheritance of tradition & locality.

On the other hand, this study was focused on deriving the factors and classification system, and each factor from the evaluation criteria would be suggested by an ongoing study. It is expected that there could be more penetrations towards the housing market by implementing well-inherited New-Hanok.

Acknowledgment

This research was supported by a grant (14AUDP-B070933-02) from Urban Architecture Research Program (Development of Hanok Technology, Phase II) funded by Ministry of Land and Transport Affairs of Korean Government.

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