

## A Study on the Sign System for the Disaster Prevention Design in the Traditional Villages -The case of Korea & Japan-

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### ABSTRACT

*A traditional village is cultural property where old buildings and traditions are concentrated and also where indigenous traditional cultures can be recognized and experienced directly or indirectly. In addition, traditional villages have been recognized as precious resources to revitalize regional economies through tourism. Currently, signage systems have been developed as for ordinary tourist sites or cities, and concepts or methods for sign system for traditional villages have not yet been established. Therefore, it is necessary to develop disaster prevention-based signage to prevent large-scale disasters, to guarantee the safety of residents, and to increase the satisfaction of visitors in traditional villages as precious resources. A case study is conducted to apply the proposed sign system for traditional villages in Korea and Japan as a tourist-oriented sign system that has been accomplished in Korea and a large disaster-oriented sign system developed with residents as a priority in Japan. The disaster prevention sign system considers the residents since residents are victims when a disaster happens, and guideline to increase the efficacy and satisfaction are suggested. However, this study has definite limits in sucring objectivity because the objects of study are insufficient, and the development of the sign system based on effective disaster prevention considering the features of traditional villages will continue in the future.*

**Key words:** Disaster Prevention Design, Sign System, Traditional Villages.

### 1. INTRODUCTION

#### 1. 1 Background and Purpose of Study

Traditional villages are very precious resources to recognize and experience the indigenous traditional culture directly or indirectly in our everyday lives together with the values as cultural properties [1].

In case of most cities with history of decades, as the place that the color of the city has been the old urban areas or historic district that has been protected institutionally, traditional villages are the places that old buildings and traditions are concentrated and have been recognized as a culture education

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space and as precious resources to vitalize the regional economy through sightseeing. Currently the sign system development has been accomplished thoughtlessly as it has been performed in ordinary tourist sites and cities in the state that the definite concepts and methods of the sign system in traditional villages have not been established. Therefore, the purpose of this study is to recognize the necessity of disaster prevention design based sign system, 1) to ask what the sign system is and why the disaster prevention design is necessary, 2) to suggest the differences and implications applying the sign system to the traditional villages in Korea and Japan. 3) to suggest the design guideline to develop effective disaster prevention design based sign system considering the features of traditional villages.

### 1.2 Methods of Study

The methods of study have been performed by the literature research, the investigation of materials on the internet, the case study of applying the sign systems that has been taken through actual visiting of the sites. By comparing the traditional villages in Japan showing similar patterns to our traditional villages, to understand the problems of our traditional villages and to study the sign system for traditional villages based on more developed disaster prevention designs have been raised as the method of study.

The significance of this study is to estimate the future through the case study of applying the sign systems for the traditional villages in Korea and Japan, and to suggest the development principle of disaster prevention design based sign systems.

### 1.3 Object of Study

The objects of this study are Oeam Folk Village located in Asan city, Choongchungnamdo, in Korea, and Beppu Spa Village located in Beppu city, Oita prefecture in Japan. In case of Korea and Japan, the classification can be various. The objects, Oeam Folk Village in Korea and Beppu Spa Village in Japan can be categorized as the urban areas, and are representative exemplary cases that the residents of the region accomplished the preservation of the village through upward approaches, and currently various efforts are being made to maintain and manage through the support from the local government. In addition, those two objects have similarities that many timber houses are located and many senior citizens by aging are living in the places and those two places are tourist attractions.

## 2. THEORETICAL CONSIDERATION

### 2.1 Sign System

#### 2.1.1 Concept of Sign System

Sign is the notice to transmit meanings and to be used as the meaning described as signature, display, mark and signal, and to indicate the method showing as symbols. Therefore, it is the symbol with meaning and contents as the basic standard of communication and the mean of information transfer helping

for the human being to understand the environment and behave [2].

The sign system is a system of signs by which information can be delivered to users in a much easier way by providing order to sign environment. For this purpose, design should be planned in consideration of aesthetic features which can be harmonized with the functional side of information delivery and space to be constructed.

The purpose of the sign system is for people to perform the behavior pleasantly and safely in a certain environment, and the plan of the sign system is to install by systematic research and investigation.

#### 2.1.2 Requirements of Sign System

The sign system should be developed in consideration of functional as well as aesthetic aspects so that information can be delivered speedily and correctly in terms of function and users may feel comfortable by means of harmony with the surrounding environment in aesthetic terms.




Table 1. Requirements of Sign System



<b>Functional aspects</b>	<ul style="list-style-type: none"> <li>• Readability: calligraphic style, size of letters</li> <li>• Simplicity: information, elements</li> <li>• Unification: visual, functional</li> <li>• Continuity: behavior, climate, 24hours a day</li> </ul>
<b>Aesthetic aspects</b>	<ul style="list-style-type: none"> <li>• Reliability: friendly, comfortable, safe</li> <li>• Beauty: elegant, harmonious</li> <li>• Comfort: clear-cut, smart</li> </ul>

#### 2.1.3 Classification of Sign System

The sign system can be broken down into orientation, directional, identification, statutory and informational signs in terms of function and objective of signs as follows.

Table 2. classification of sign system

Division	Contents	
<b>Orientation sign</b>		The sign in this system provides users with an overall view of space in order for them to easily catch hold of their current location by means of map and ground plan.
<b>Directional sign</b>		Names, figures, arrows and distances are indicated to help users reach their destination easily.
<b>Identification sign</b>		Users are given information with names attached to objects or certain space to enable them to make distinction between them.

<p><b>Statutory/ Regulatory sign</b></p>		<p>For the sake of safety or public interest, warning sign is posted in danger spots or certain restriction, when needed, is enforced to users.</p>
<p><b>Informational sign</b></p>		<p>The sign may give instruction or introduction to users to understand how to make use of objects.</p>

**2.2.4 Components of Sign System**

Sign systems can be classified as visual factors, structural factors and construction methods, and the most important visual factor for information transfer is composed of the layout, colors, letters and pictograms, and the structural factors determining the durability and safety of the sign are material, shape and texture. In addition, the construction methods selected by the location and situations are made up of format, lighting and finishes.

**2.2.5 Application Principle of Sign System**

**① Installation Principles**

The landscape of villages including surrounding natural environments should be considered for the installation principle of the sign system without limiting the spaces only. The application of the sign systems should be performed in the form of being supported actively by the local government together with residents' leading roles. Immediate installation is possible when the local government and the residents of the village become core subjects, and the brand value of the village can be maximized by maintaining quality.

**② Installation Configuration**

The configuration of the sign system maintenance and management is classified as intentional configuration and unintentional configuration. The intentional configuration is to create and operate the ordinances in the form of internal regulations of the village in the institutional aspects, and the unintentional configuration is to promote the efforts of the residents for the sign system management including cleaning and maintenance.

**③ Installation Conditions**

Installation of the sign systems should be performed in interrelation and should be accomplished by the process of agreement, not by the compulsory or artificial process. The factors damaging the existing environments and influencing the sudden changes should be decreased gradually through the process of agreement and the efforts to maintain the indigenous image of the space should be made.

**2.3 DISASTER PREVENTION DESIGN**

**2.3.1 Definition of Disaster Prevention Design(DPD)**

Design behaviors of human have been started with the history of mankind fabricating instruments or housings for their survival. But nowadays design exerts a great influence even on the essence of human. Design is originally a communication

activity that gives shape to the thought and/or image of designer to deliver into the conclusion throughout some real modeling. So design is usually willing to generate aesthetical styles as well as fitting the usage of that objects [3].

Therefore we can define 'Disaster Prevention Design' as follows; DPD is a kind of design activity that protects life and property of human beings, minimizes damages, and makes the recovering process rapid and easy, against any kind of disasters.

**2.3.2 Necessity of DPD**

We present necessity of Disaster Prevention Design as in Table 5, which divided into its classification and contents. The increment of uncertainty, interoperability, complexity, and cumulative characteristics in the future society make the necessity of DPD more serious.

Table 3. Necessity of DPD, Division & Contents [4]

Division	Contents
<p><b>Increment of Weak-Party for Safety</b></p>	<p>Increasing gap between the rich and the poor Increasing female's social activities Entering an aging or super aging society Increasing disabled persons because of various accidents</p>
<p><b>Increment of Dangerous Entries</b></p>	<p>Increasing natural disasters(climate changes) Increasing artificial disasters Increasing accidents in big cities Diametrical separation in fortune</p>
<p><b>Increment of Consumer's Requirements</b></p>	<p>Increasing requirements for safety Increasing personal requirements for services Increasing high quality &amp; variety Increasing urban survivalists Expectation of increment in the market of personal disaster prevention</p>
<p><b>Social Variations</b></p>	<p>From recovery to precaution orientation From facilities to human orientation From physical to psychological recovery Increasing requirements for convergence of response, prevention, and recovery</p>

**2.3.3 Scope of DPD**

According to their methods of confrontations, we can extend the scope of DPD like 1)Mitigation or Prevention Design, 2)Preparedness Design, 3)Response Design, and 4)Recovery Design [4].

As for the design development of Sign system, it corresponds to mitigation design and prevention design aiming at controlling and preventing the possibility of occurrence of catastrophe itself by removing or reducing in advance the causes of catastrophe based on the analysis of vulnerability of the field of prevention-oriented design.

**2.4 Korean and Japanese Traditional Heritage Villages**

**2.4.1 Asan Oeam Folk Village (Korea)**

Oeam Folk Village in Asan is the representative tourist attraction that 400,000 people of tourists visit annually, and was designated as important folklore material, No.236 in 2000. The village was formed about 500 years ago, and the houses for the gentry such as the house of Youngam, the house of vice

minister, the house of Songhwa, and 70 to 80 thatched-roof houses are harmoniously exist and still maintain the former views. Especially, the traditional methods of the upper, middle and ordinary person's houses exist in this village and so this village has been evaluated valuable to form the village and to research the traditional houses [5].



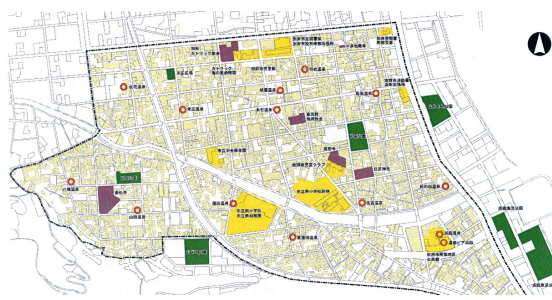
Fig. 1 Map of Asan oeam folk village

#### 2.4.2 Beppu Hot-spring Village(Japan)

Beppu city in Oita prefecture was flourished as hot spring hotels and spa from the past by the hot spring formed by volcano about 1200 years ago, and was designated as the international tourist and spa cultural city in 1950 and became the international attraction visiting 1500 tourists annually .

Beppu is surrounded by the volcanic mountains such as Tsurumi Mountain and Takasaki Mountain and 4 hot springs are located in the southern part of the city named Beppu, and in the northern part of the city named Kamekawa, and so the spa village has been formed called Beppu eight hot springs. Among them, Beppu hot spring has been flourished the most due to the abundant amount of spring water, and good condition of transportation and topography, and so Beppu became the name representing the entire spa village. The water way of bath house customers gathering to the spa village ranked as the 1 st in Japan, and the industry of the city concentrated on the service field for bath house customers and tourists such as accommodations business was overwhelming [6].

Fig. 2 Map of Beppu Hot-spring Village



#### 2.4.3 Space Structure of and Behaviors of Users in Traditional Villages

The space in traditional villages can be divided in section for public use such as main entrance, bridge, footpath, waterway, place for rest, vacant land, public lavatory, fire fighting equipment, community hall, etc. and section for private use such as interior of house, gate, wall, farm land, etc. As for behavior of users, residents may move to and fro, communicate

with neighbors, take rest, make farming, etc. as part of or for purpose of daily life whereas visitors may move from place to place for sight seeing, use public facilities in the villages, dine, buy souvenirs, etc.

Table 4. Geographic and spatial features

Division	Geographic features	Spatial features
<b>Asan Oeam Folk Village (Korea)</b>	<ul style="list-style-type: none"> <li>- Village of a same family since 500 years ago</li> <li>- Located on the foot of Mt. Taehwa</li> <li>- A waterway flows through the village.</li> <li>- There is danger of fire or other artificial disaster.</li> </ul>	<ul style="list-style-type: none"> <li>- Designated as important folklore property No. 236 (in 2000)</li> <li>- About 400,000 tourists visit a year.</li> <li>- Densely built-up tile- or grass-roofed houses</li> <li>- Highly aged residents</li> <li>- Rural village</li> </ul>
<b>Beppu Hot-spring Village (Japan)</b>	<ul style="list-style-type: none"> <li>- Spontaneously formed village following the volcanic action 1,200 years ago</li> <li>- Surrounded by volcanoes like Mt. Tsurumi, Dakasaki, etc.</li> <li>- Located near the Pacific Ocean</li> <li>- Exposed to natural disasters such as earthquakes, tsunami, etc.</li> </ul>	<ul style="list-style-type: none"> <li>- International hot-spring culture and tourist city (designated in 1950)</li> <li>- About 15 million tourists visit a year.</li> <li>- Highly aged residents</li> <li>- There are many run-down and abandoned buildings</li> <li>- Urban village</li> </ul>

#### 2.4.4 Necessity of Disaster Prevention Design for Traditional Villages

Traditional villages are the places that the old buildings and traditions are concentrated and the place with high cultural values and place that many tourists visit, and also those places have more possibilities of causing large disaster and damages of humans and materials [7]. The reasons of applying the disaster prevention design are, at first, to protect the residents and visitors from the large disasters, and, at second, to improve the environment and customers' satisfaction through safe and pleasant sign systems, and, at third, this place is exposed to the danger of various disasters as the weak people by aging have been increased in the traditional village.

### 3. STUDY ON THE SIGN SYSTEM FOR KOREAN AND JAPANESE TRADITIONAL HERITAGE VILLAGE

#### 3.1 Sign system of traditional heritage villages

##### 3.1.1 Space Structure of and Behaviors of Users in Traditional Villages

The space in traditional villages can be divided in section for public use such as main entrance, bridge, footpath, waterway, place for rest, vacant land, public lavatory, fire fighting equipment, community hall, etc. and section for private use such as interior of house, gate, wall, farm land, etc. As for behavior of users, residents may move to and fro, communicate with neighbors, take rest, make farming, etc. as part of or for purpose of daily life whereas visitors may move from place to

place for sight seeing, use public facilities in the villages, dine, buy souvenirs, etc.

Although the sign system in the traditional villages is developed with a focus on visitors for profit taking purpose, priority should first of all be given to elimination of risk factors for protecting residents from disasters since they might probably become their first victims.

**3.1.2 Problems of Korean and Japanese Traditional Heritage Villages**

The points at issue of traditional villages are first of all that there is high risk of fire because of densely built-up wooden buildings, difficult access of fire fighting vehicles, and fragility of the old and their weakness to safety. In addition, there is usual possibility of conflicts to explode among residents concerning the issue whether to choose preservation of tradition or development, privacy inflicted by tourists, distribution of profits, etc.

① **Old wooden buildings vulnerable to fire**

In case of Oeam Village, there are 69 houses for living in total and 19 of them have been built newly since 2000. Most buildings are made of wood and approximately 54.2% of total houses (177 composed of 81 with tile roof and 96 with grass roof) are vulnerable to fire since they have grass roof. In case of Beppu in Japan, wooden houses occupy 81% of all and 39% of them are 40 years or older.

② **Fragility of aged people to safety**

In Beppu, Japan, 38.3% of the residents are highly aged and, in Asan Oeam Village, most inhabitants are advanced in years too, making it hard for them to escape from disaster and exposing them to various risks likely to be caused by outsiders.

③ **Narrow roads cause fire engines and ambulances hard to access**

In Beppu, Japan, 48% of the roads are 4~6m wide, while most roads of Oeam Village are just 2~4m wide. The southern access road and the central road passing through the village only allow fire cars to access. Fire plugs and extinguishers are therefore must for villagers themselves to put fire under control in the beginning stage.

**3.1.3 Risk factors of Korean and Japanese traditional heritage villages**

The risk factors of Korean and Japanese traditional villages include increasing exposition of old people to falling, fire, traffic accidents, etc. from inside and to earth quakes, tsunami, terrors, epidemics, etc. from outside. Particular attention should be paid to the fact that lots of old buildings and valuable heritages are densely located in the traditional villages in Korea and Japan as well. Once, therefore, a disaster occurs there, there is great plausibility of its developing to a large-sized one with enormous damages personally and materially as well.

Table 5. Risk factors of Korean and Japanese traditional heritage villages


Division	internal factors	External factors
Asan Oeam Folk Village (Korea)	fall, disease, fire, explosion, Traffic, collapse, accident, violence, suicide etc.	heavy rain, typhoon, hurricane, heavy snowfall, drought, thunderbolt, yellow sand, environmental pollution, infection, terror, forest fire, theft etc.
Beppu Hot-spring Village (Japan)	fall, disease, fire, explosion, Traffic, collapse, accident, environmental pollution, violence, drowning, suicide etc.	flood, earthquake, heavy waves, typhoon, hurricane, red tide, tidal wave, environmental pollution, infection, forest fire, tsunami, theft etc.

**3.2 A comparative case study on the sign system of the Korean and Japanese traditional heritage villages**

The visual factors and the structural factors of the sign system should be unified and should imply regular orders as the integrated image system. Sign systems have been classified as visual factor, structural factor and construction method, and the purpose of this study is to review its features by extracting the factors in comprehensive aspects as this study is to research the sign system based on disaster prevention design. The analysis has been performed with the photos of the sign systems that had been taken during the visit of Oeam Folk Village in Ansan and Beppu Spa Village from August 2014 to January 2015.

**3.2.1 Asan Oeam Village**

Table 6. Analysis of Asan 'Oeam Village

Division	Contents	
Image		
Visual Elements	Layout	Characters, Figures, Pictograms, Arrows are used, Simple and space free Align center, Justify all lines
	color	Gray, White, Yellow ground Black, Red Characters and Pictures
	Type	Sans serif, serif
	Picto gram	Arrows, Forbidden signs
Structural Elements	Material	Metal, Timber, Plastic (acryl resin, PVC sheet etc.)
	Feature	Square with rounded edges, Rectangles
	Texture	Smooth, hard, and Shiny
Construc tional Methods	Model	Stand (Column or Mobile) / Attachment
	Illumi nation	Outer / Reflection / No light
	Closure	Silk Printing / Sheets

The sign system in Asan Oeam Village was installed lately and seems orderly. But, in fact, some of it is still used in mix with old ones and made by residents themselves crudely, making it look like unreliable and improperly managed. Moreover, residents felt inconvenient with the sign system

which is installed not from the residents-oriented standpoint but from the visitors-oriented one.

### 3.2.2 Beppu Onsen Village

The sign system in Beppu Hot-spring Village is also a mix of outdated and newly installed ones, producing by thus an inconsistent impression.

Table 7. Analysis of Beppu ‘Onsen Village’

Division		Contents
Image		
Visual Elements	Layout	Maps, Characters, Pictograms, Arrows are used, Full display and readability Align center, Align left
	color	White ground, Black, Red, Blue, Yellow Characters and Pictures
	Type	Sans serif, Cali-graphy
	Picto gram	Arrows, Forbidden signs
Structural Elements	Material	Timber / Metal / Plastic (PVC sheet etc.)
	Feature	Squares, Rectangles
	Texture	Rough, Crude, and Solid
Construc tional Methods	Model	Attachment / Stand (Column or Mobile)
	Illumi nation	Reflection / No light
	Closure	Paint / Sheets

Characteristically, directional sign is installed to take precautions against tsunami, the biggest predictable disaster in the area, with notes of height, shelters and arrows to guide residents to escape rapidly from danger. It is also noteworthy that preferential treat is given to residents by setting up many bulletin boards within the district as space for communication among residents.

### 3.3 Guideline for development of sign system based on DPD

#### 3.3.1 Design Guideline of sign system

Based on the analysis of the sign system in Korean and Japanese traditional villages, following guideline was worked out for residents-oriented design which can satisfy visitors, too. This guideline is prepared to install the sign system based on DPD from the perspective of mitigation and prevention design as well as from the perspective of preparedness design.

Table 8. Design Guideline of sign system

Division	Details
Main entrance	<ul style="list-style-type: none"> <li>Information signboard (permanent)</li> <li>Village map, explanation about village, caution or warning, time to visit, lavatory, shelter, information about events, location of fire plug, etc.</li> <li>Directional signboard (permanent)</li> <li>Buildings, direction, distance, etc.</li> </ul>

Footpath	<ul style="list-style-type: none"> <li>Directional signboard (permanent)</li> <li>Name, figure, direction, distance indicated</li> <li>Instruction to keep left at the crossing</li> <li>Ground light on the pavement (also at night)</li> </ul>
Wall	<ul style="list-style-type: none"> <li>Regulatory signboard (permanent)</li> <li>Don't climb up, video camera recording, etc.</li> </ul>
Before front gate	<ul style="list-style-type: none"> <li>Information signboard (permanent)</li> <li>Photo, ground plan, explanation, etc.</li> <li>Regulatory signboard (mobile)</li> </ul>
Interior	<ul style="list-style-type: none"> <li>Information signboard (mobile)</li> <li>Type of plausible accidents, prevention of accidents, emergency call, what actions to take in emergency, how to use fire extinguisher, etc.</li> <li>Identification signboard (permanent)</li> <li>Exit, fire extinguisher, emergency button, etc.</li> </ul>
Vacant land	<ul style="list-style-type: none"> <li>Information signboard (permanent)</li> <li>Village map, lavatory, caution or warning, time to visit, shelter, location of fire plug, etc.</li> <li>Information signboard (permanent)</li> <li>Type of plausible accidents, prevention of accidents, etc.</li> </ul>
Parking lot	<ul style="list-style-type: none"> <li>General information signboard (permanent)</li> <li>Village map, introduction of village, caution or warning, etc.</li> </ul>
Fire fighting equipment	<ul style="list-style-type: none"> <li>Identification signboard (permanent)</li> <li>Fire plug, emergency call, fire extinguisher, etc.</li> <li>Information signboard (mobile)</li> </ul>

#### 3.3.2 Improvement Aspect of Sign System

The disaster prevention design based sign system development of traditional villages in Korea and Japan should be planned in priority of the residents who might be damaged when disasters happen, and the sign system development should be focused on the predictable large disasters. In addition, the improvement on the settlement condition of the villages and the design improvement aspect of the sign system for the users' satisfaction are shown in Table 9.

Table 9. Improvement Aspect of Sign System

Division	Sign system	
	Before	After
Asan Oeam Folk Village (Korea)		
Beppu Hot-spring Village (Japan)		



At first, visual communicability should be increased by using graphical symbols, safety colors and safety signs appropriate to ISO 7010

At second, materials, shapes, colors and fonts should be designed with unity to be harmonious with the installation place by not damaging the environment of traditional villages.

At third, flexible sign systems should be established by using squares available to be applied to different construction methods and shapes.

At fourth, caution of disasters should be recognized in ordinary days through providing accurate information.

At fifth, facility environment should be established that the users can use safely and pleasantly by using braille blocks considering the weak persons in safety matter, audio guidance and lighting subsidiarily.

#### 4. CONCLUSION

This study analyzed the problems of the sign systems through the case study of the two traditional villages in Korea and Japan, though these, the development principle of disaster prevention design based sign system have been suggested. This study has the limit of securing objectivity due to insufficient objects of study, the approaching methods to create the sign system of traditional villages and the differences on using disaster prevention design have been sufficiently confirmed.

Through those results, the fact that something necessary to the traditional villages is not the ordinary sign system, but the disaster prevention design based sign system has been confirmed, and most of all, the establishment of the organized residents oriented sign system should be planned, and through this, the improvement of settlement conditions, brand value, and contribution to customers' satisfaction can be expected. As the sign system can not be accomplished by short term investment, but accomplished by continuous efforts, the responsibilities on maintenance and management should be performed cooperatively, and it will be able to relieve conflicts and solve fundamental problems.

Through the developed follow-up studies, the effective disaster prevention based sign system development considering the features of traditional villages has been expected to be accomplished.

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