



Intangible Aspects on Vernacular  
Architecture Between Joglo Pencil  
Kudus (Java Traditional House) and  
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Comparative Study about Philosophies  
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Country : Indonesia



# Intangible Aspects on Vernacular Architecture Between Joglo Pencu Kudus (Java Traditional House) and Hanok (Korean Traditional House): Comparative Study about Philosophies and Local Insights of Traditional Houses

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## Abstract

This research discussed the intangible aspect such as philosophy and local insight that lies in the traditional house of Joglo Pencu Kudus from Indonesia and Hanok from Korea. Based on the result of research found that both traditional houses have the philosophy to respect nature and can adapt to the environment around them. Hanok can adapt to two extreme seasons (harsh winter and humid-hot summer) while Joglo Pencu Kudus can adapt to two seasons (rainy and dry).

Moreover, the materials used in both traditional houses are natural and originate from the environment. Some constructions support sustainable development and it can be developed or combined further with the recent necessity. Some of its constructions can deal with the earthquake and heavy storm. Even some local insights can be applied directly such as natural waterproof from Hanok and natural substance for the preservation of wooden houses from Joglo Pencu Kudus.

**Keywords: Heritage, Intangible, Local Knowledge, Philosophy, Traditional House, Vernacular Architecture.**

## Introduction

### The Important of Local Knowledge

Local knowledge-in other terms are traditional knowledge, indigenous knowledge, or traditional wisdom-is all facts related to all concepts and systems, believe, and people's perception of the world around them. The community observes their environment through this knowledge to solve the matters and validating the new information. So, societies release the insights which were saved and applied for themselves, or they share it with other inhabitants. These insights were developed based on their experiences which were tested for centuries, compatible with local culture and environment, and embodied in community practice, institution, and ritual, as well as growing dynamically ([fao.org/3/y5610e/y5610e01.htm](http://fao.org/3/y5610e/y5610e01.htm)).

Local knowledge is the main asset to survive, food production, to provide safety and protection, or manage their life. Local insight is relevant to different matters happening in the present day. For instance, in the agriculture sector, society in one region has an understanding which is correlated with the selection of the crop, intercropping, time cultivating, management of soil fertility, and controlling wild species sustainably. They understand the breeding strategy on animal husbandry, animal characteristic, and livestock treating method using natural herbs around them. They know the benefit of some vegetation which can be medicine and a variety of traditional alternative therapy. In the community development field, inhabitant recognizes the system against poverty, social manners, social structure, education, and government. The core is they can survive, adapt, and improve social quality. These insights can be a solution to problems that occur in the present. This is one of the components in a complex system or it can be said regarded as a part of global knowledge (components in a complex system or it can be said regarded as a part of global knowledge (components in a complex system or it can be said regarded as a part of global knowledge (

On the other hand, sometimes local knowledge needs the interpretation because it looks like unreasonable or unscientific and embodied on cultural practices such as ritual, custom manner, legend, myth, philosophy, etc. So, local knowledge is one of the cultural elements. Due to this fact, local knowledge is an ICH domain which is important to be searched and be conserved.

### The Important of Safeguarding Intangible Cultural Heritage

Undeniable that ICH contributes to sustainable development e.g. conservation of biodiversity, natural resources management sustainably, educational method and system, responsible for a natural disaster, as well as ICH shows to modern generation how to adapt to nature. For example, some folklore in Indonesia on poetry, story, and song contain the indication of natural disasters and how to deal with it. Due to its folklore, some communities can avoid disasters such as earthquakes, tsunami, land liquefaction, flood, etc. The other example can be found in the water management

of the Mayan Tribe in Mexico. They believe that water is an inseparable part of human living so that they consider neutralizing the water resources. Therefore they can manage water sustainably (Mancacaritadipura:2013:5).

Hence, society in various part of the world always finds the way to systematize and transmit knowledge, life skill, and their competence for the next generation, particularly on something related to a natural and social environment. This is a contribution of ICH on the education area. ICH also contributes to the biodiversity area. The women from Kikuyu Ethnic, Kenya, played the role in cultivation and preservation of seed. According to their tradition, women planted various beans on the same farm and saving several seeds as a reserve if there are a harvest failure and unpredictable climate. Recently, these various seeds are a treasure from traditional wisdom, which is more valuable after decades occurring the impoverishment of agriculture resources at the national level due to monocropping (Mancacaritadipura: 2013: 5). Therefore, farmers, breeders, fisher, and traditional healers are the guardian of biodiversity. Besides, there are still many ICH practices supporting sustainable development.

Paying attention that ICH, particularly local knowledge, is very useful for life nowadays and the future, therefore, safeguarding should be carried out. This is one of the reasons to safeguard our ICH. The effort of maintaining ICH is transmitting the insight, skill, and understanding. Transmission is how to communicate and teach the ICH to the next generation ([ich.unesco.org/en/transmission-00078](http://ich.unesco.org/en/transmission-00078)). Even some ICHs in a community can be applied to others either applying directly or need modification. For example, batik tradition -a tradition to decorate the weave originate from Indonesia- also can be found in Malaysia with a different design. Then, Yin and Yang's philosophy originates from China also can be found in Korea.

## ICH Domains

The 2003 UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage released that there are five domains of ICH:

1. Oral traditions and expressions, including language as a vehicle of the intangible cultural heritage,
2. Performing arts,
3. Social practices, rituals, and festive events,
4. Knowledge and practices concerning nature, and the universe, and
5. Traditional craftsmanship

These domains are not limited to single manifestation. There are some domains in every ICH usually. For illustration, there are performing art, oral traditions, and philosophical practices toward natural and social relationships on some ritual customs. The same thing happens on keris a dagger with a wavy blade from Indonesia as a creation of traditional craftsmanship- which has a high aesthetic value, keris is also used in ritual ceremony and the production process, as well as conservation technique, needs unique local knowledge (Swastikawati, 2014,14).

Besides, ICH domains found on Tangible Cultural Heritage, for instance, on vernacular architecture or traditional houses, it is found that all ICH domains such as philosophy, knowledge, and practices concerning nature and the universe, as well as traditional craftsmanship to establish the traditional house.

## Definition of Traditional House

One of the human adaptations to the environment is an adaptation of socio-cultural aspects that can be found in their own cultures such as settlement area and house. The settlement pattern can describe the way of people to rule themselves and their community on earth. This is also a reflection on nature, technology, and socio-culture institution ruled on the community (Subroto, 1985: 176).

According to Van Romondt who said that house is a human shelter to face the hot, cold, rainy and windy weather (Said, 2004: 47). House as a residence is a human creation to support their needs such as gathering with the family, the requirement to defend and protect themselves from natural, animal and other human disorders. For some communities, especially java ethnic, the house is the requirement for fulfilling life besides clothing and food. As one of the requirements of life and settlement, the house is believed as a benchmark (standard) the peace of a family. It is because a family will feel in peace if they have their own home (Wibowo, 1982: 25).

The definition of a traditional house is a building that has a structure, techniques, shape, function, and has the uniqueness of ornamental variety. Traditional houses are inherited from generation to the next, and it can be used by residents to perform life activities as well as possible (Said, 2004: 47). The term "tradition" means a practice carried out from several generations in the same way without change or just a bit. Traditional house, for the conservative community, was established not only for physical activities but also for the practical utility such as sleeping, working, and educating their family. The traditional house is also imaginary expression in a real form that represents the universe, as well as the existence of myths about something (God or Creatures) which have the power to rule nature and it is embodied in their mind. So establishing the house means that creating the "small nature" in the universe or house is a small part of the universe. It is considered starting a new life (Said, 2004: 49). In other words, tradition is a habit which already been customary and entrenched. So, the term "traditional house" is a house built and used in the same way from several generations (Said, 2004: 48).

The description above shows the importance of the meaning of home for a community. House is not only a result of physical culture or tangible, but it is also related to a variety of techniques, political, social, economy, belief, rule, history, and psychology, as well as other knowledge (Soekiman, 1986: 6). In terms of building traditional houses, there are some interesting aspects such as traditional technique, the shape of the building, the measure of building, materials, variety of ornament, and direction (Soekiman, 1986: 5).

## **ICH elements on Vernacular Architecture**

Generally, cultural heritage on vernacular architecture has two aspects, tangible and intangible. The tangible aspect is the building itself whereas the intangible aspects are the philosophy on each element of the building, the knowledge behind the construction and conservation method as well as traditional craftsmanship (Karakul, 2014, 165). All styles on vernacular architecture are established to fill the necessary combining traditional values, economy, and culture lifestyle of the owner (Rapoport, 1969:10). The construction itself is also built to adapt to the weather, geographical position, and nature around them. Material and substances used are organic substances and can be found easily in their environment (Rapoport, 1969:10). The skill to construct the vernacular architecture was obtained from one generation to the next and each building process also has the philosophy. This is a part of knowledge and practices concerning nature on ICH lied on vernacular architecture.

Some intangible aspects have each similarity and uniqueness even aspects itself can be applied or combined with other traditional houses or modern architecture. For instance, the intangible aspect of Hanok has similarities with Joglo Pencu Kudus especially about philosophy, some building constructions, and has traditional conservation system. I also found that a combination of vernacular and modern architectures in plenty of places. In this research, I will study the domain of local knowledge of Joglo Pencu Kudus, Java Traditional House, and Hanok, Korean Traditional House. The domain of local knowledge on both traditional houses is philosophy, the knowledge behind the building construction, and the traditional conservation method, as well as other unique insights.

## **Hanok and Joglo Pencu Kudus**

The building of Hanok pays attention to the environment. Hanok construction adapts for four seasons in Korea Peninsula. Hanok was made from natural substances i.e. wooden, stone, straw, soil, mud, and the paper was made from mulberry tree by a simple process, has a heating system which is called Ondol and cooling system called Maru, and the position of Hanok adjusts the condition in each region (Jackson, Koehler: 2012:20). Every Hanok construction also has a philosophical background enriching the cogitation behind the establishment. Besides, Hanok also has a special part in a social and personal activity.



**Jeonju Hanok Village (Source: Aff)**

Paying attention to such traditional houses, there are many similarities between Pencil Joglo Kudus in Indonesia and Hanok particularly on the adaptation to the environment. Pencil Joglo House is a wooden traditional house in Kudus Area, Central Java, Indonesia. This construction gave insight on acclimatization, offering a system of social manners and how to adjust and protect their own culture. The community also understands how to maintain their wooden house from pests which is very often deteriorating their house. They have the traditional herb to protect the house from pests attack. I will explain this traditional herb in this research. Their understandings as a part of ICH has been applying to their traditional house and it can be called Tangible Cultural Heritage. Therefore it has the philosophy behind each component.

One of the most interesting ideas from plenty of local knowledge on Joglo Pencil Kudus is how the people conserve their house traditionally which I do not find in other traditional houses in Indonesia until their house can survive longer and the most important is traditional conservation is eco-friendly with abundant materials. This can be an answer to the environment and also a solution to protect the wooden traditional house in many regions. This conservation method has been studied scientifically by stakeholders and scientists in Indonesia and I will explain the method of their research.



**Traditional House of Joglo Pencil Kudus (source: warisanbudaya.kemdikbud.go.id/)**



This can be a place to exchange ideas because local insight might be embodied in traditional houses that can be put in other modern houses through the combination of traditional and modern in recent conditions. In addition, the author is also interested to learn how Korean safeguard Hanok and protect it from the agent of deterioration such as fire, water, pest, physical force, neglect, theft and vandalism, incorrect temperature, incorrect humidity, chemical deterioration, and light. If their traditional house can be protected from 10 agents of deterioration, it supports sustainable development ([www.canada.ca/en/conservation-institute.html](http://www.canada.ca/en/conservation-institute.html)).

## Objective

1. To learn about the philosophy behind Hanok and Joglo Pencu Kudus
2. To find out about the adaptation of structures of building on both vernacular architecture to their environment
3. To study ideas on how to conserve Hanok and Joglo Pencu Kudus from the agent of deterioration traditionally

## Research Methodology

1. Observation of Hanok
2. Literature Review

## Discussion and Analysis

1. Local Insight gained from Both Vernacular Architecture
2. Some inspiration from both traditional houses which can be applied in the present
3. Some inspiration originated from techniques and structures of traditional houses which can be developed to other building

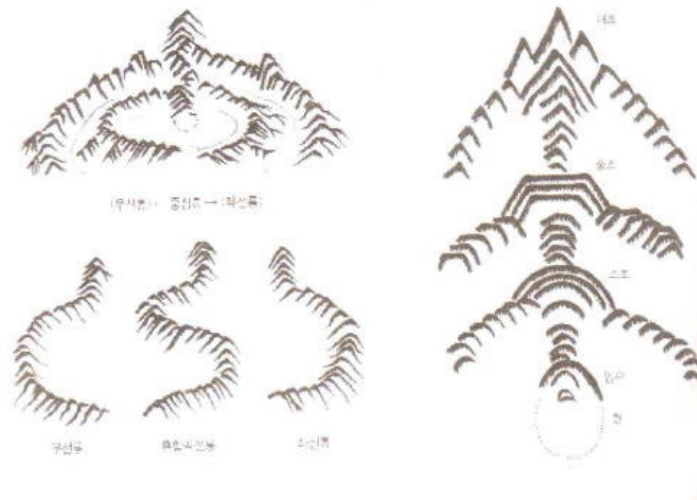
## Conclusion and Recommendation

## I. Intangible Aspects On Hanok

### PHILOSOPHIES OF HANOK

#### 1. The Influence of Pungsu (Feng Shui ) on Hanok

As a masterpiece of culture, Hanok contains the philosophy behind its building. The philosophy of Hanok is based on Pungsu. The terminology of Pungsu is Feng Shui. This originates from China. Moreover, there is a term of Taengniji on Pungsu which means ecological guidance for Korea. Taengniji explained the requirements to identify the ideal place for human living. This guidance explains some standards have to be observed e.g. excellent topography, ecology, healthy atmosphere, and hills as well as water. The topography of residence should refer to spatial which have mountains and rivers around that. Ecology should pay attention to the matters coming from the land such as land fertility. The meaning of a healthy atmosphere is the character of a local inhabitant. The last criterion is mountain and river which shape the beautiful scenery three of four factors related to the earth. This shows that the selection of Korean residence pays attention to natural conditions (Yi, Chung.Hwan:1998).



The Principal of Pungsu, an ideal site for Hanok (source: The Encyclopedia of Korean Culture)

Then, mountains and rivers are the most important element of Pungsu. Mountain is needed to utilize the wind whereas the river is a water resource. In East Asia's perspective, nature is the world that has an abundance of energy which moves continuously called Gi (In the Chinese language called Qi). The wind transports the sky energy to the earth while water brings the earth energy. So, the location of residence around the mountain and river is the most effective to use the energy and it is believed that the energy will flow to the people inside the house built in such location. The principals of Pungsu are suitable to the Korean Peninsula because there is a lot of mountain and river flow until the Pungsu concept which is

almost called an interpretation feature of Korean Topography (Jackson, Koehler: 2012:20).

After understanding the philosophy of residence selection, the next step is the selection of house location. The first and the most essential step in traditional Korean architecture in choosing the location of the building is involving the accurate interpretation of land topography. This location visualizes the setting of the high mountain behind the house and the large land in front of which has a river. This location is called Baesan Imsu and it was believed in promising many things (Yi, Chung.Hwan:1998). After the site is chosen, the land is leveled and prepared for building construction. The second stage is determining the direction of the building. Hanok should be directed to the mountain because the mountain is the only one of the natural elements considered unchanged and eternally.

## **Local Insights Of Hanok**

### **1. Maintenance of Wood And Stone**

There are some techniques to create the materials to well-preserve and for durability on Hanok. Those techniques called Geurengijil and Deombong Jucho. Geurengijil is a tool to draw the curves to the base of a pillar and then carved with an adze. The base of the wooden pillar should be shaped as appropriate as the foundation of the stone surface so that both of them are interlocked each other. The process of making geurengijil is named Deombong Jucho. The stone foundation is positioned on top of the ground and the pillar is put on top of the foundation. The base of the wooden has to be carved to follow the stone surface pattern. And the wooden pillar which is not flat or wavy, it looks like gears are interlocked. This construction can withstand any horizontal forces such as earthquakes or storms (Jackson, Koehler: 2012:20).

On the other hand, this method can prevent weathering due to water. The timber will rot easier if the water is absorbed inside or due to the capillarity of groundwater. The capillarity will be obstructed by stone due to such type of foundation. Afterward, the structure method without glue adhesive or locking device such as nail can reduce the humidity on the wooden or stone and it also will decelerate stone crack and wood decay.

However, it is important to know that timber is a living organism and complicated to be saved. The timber should be breathable, easy to decay, and easy to be curved. So the procedure of timber on Hanok should have cared for the location of the tree. If the tree is located in the southern mountain of Korea, then it is more suitable to use around that region as well as other regions. Then, the selection of pillar wooden and girder bearing the structure must be made of trees that grow along the wooden path. Only the strong and sturdy trees which can survive from the storm in the top of the mountain and compatible to be used as a pillar and girder should be used. In contrast, the trees grown up around the humid valley with the cold temperature should be utilized as a wall or decoration because its wood is soft and easy to be shaped.

## **2. Dealing with Weather**

### **a. Ondol and Maru**

Korean Peninsula has four different seasons, two of them are so extreme e.g harsh winter and humid-hot summer. These conditions cause the Korean people should design the house architecture which can adapt to that extreme season. Their traditional house can hold the hot weather during winter and can be cooler during summer. Moreover, Korea also accepts the heavy rain and snow so that they made a strong and high-pitched roof. The strong roof released the heavy load because the crossbar and the column are solid and thick. The most interesting feature in Korean Architecture is integrating Ondol and Maru. Ondol is the heating system under the floor developed to produce the heat during winter while Maru is the wooden floor designed to maintain the coolness of the interior in summer or humid weather (Bonghee, Jeon: 2017:159).

Ondol is heated trough floor chimney and it should be built nearby land surface to minimize heat loss. On the other way, Maru has to be established beneath the ground surface or it has to be lifted to reduce the humidity. Combining of two opposite building functions in one construction system is not easy. This shows that Korea has more sophisticated traditional wisdom to deal with extreme climate or weather. In other countries like China, they have a heating system called Kang. But Kang is not combined in the same building (Jackson, Koehler: 2012:20).

### **b. Maksae and Cheoma**

The Korean Peninsula receives heavy rainfall every year. In the past, building a leak-proof roof was not easy. In this case, a thick soil layer is put on the inside of the roof. This layer functions as isolation, keeping the cool atmosphere inside the house in summer and still warm in winter, even though it adds the weight of the roof. However, the most crucial element on this waterproof decides the right slope for the roof. If the slope of the roof is too flat, the water will accumulate and absorb it into the building. In contrast, if the slope of the roof is too steep, the tile will fall down (Jackson, Koehler: 2012:21).

Hanok has a concave curve roof and this is very effective to prevent rainwater and appear an attractive appearance. This curve is called Cheoma and the slightly raised edge of the traditional tile roof is called Maksae. Maksae does not only look beautiful but also arranging interior temperature. This part has been pulling the sunlight into inside the house in winter and producing the coolness in summer all at once until it helps maintain the stability of the house interior. This is the traditional wisdom of Korea to deal with weather and environmental conditions.

### **c. Natural Waterproof**

The wall of Hanok is usually made from soil using a variety of methods. First, a mud in front and on the back is established then it is fulfilled until the thick of wall is around 40 centimeters, the wind can be escaped either in winter or summer. Another method is establishing the bamboo frame before dabbing the mud in front and on the back. In some cases, Pieces of straw is mixed with mud then the mud is squeezed with boiled water which was boiled with algae (Laminaliales) and other seaweeds to add the adhesive strength of the wall. Water boiled with seaweed is excellent organic waterproof which is often used on modern construction because it is effective to hold water and at

the same time the stuffy air and humidity release thorough the wall surface. When the soil particles are mixed with seaweed water, the gap between them creates such ventilation to release the air inside the wall and also prevent the rainwater (Jackson, Koehler: 2012:23).

#### **d. Changhoji (Hanji)**

The window is built on the wall of the house to give the natural light, ventilation, and scenery outside. But if the window is made from wood lath, the three functions are only realized when the window is opened. However, open-window is not a reasonable choice in winter. Due to that fact, Korean people utilize Changhoji. Changhoji is the paper for windows and doors. Changhoji is made from mulberry skin fiber. A semi-transparent which can reduce the light intensity (Minah Song and Jesse Munn: 2005: 2). The sunlight coming into Hanok is processed through changhoji before it comes to the inside of the house. So that the light on inside the Hanok becomes more comfortable to the eyes, it is not hot and not sting. This paper prohibits the warm air from going out. It makes the interior of light in medium level, not dark or bright. The fiber of changhoji also blocks the cold air from outside enter Hanok but the fresh air is possible to circulate through the house. Such illumination and ventilation happen when the windows are closed. This effect only happens on windows paper. When the glass window is closed, the lighting is possible to be done but not for ventilation.

## **CONSERVATION OF FOREST**

### **Geumsan: The forbidden Forest**

In the last 14th centuries, Joseon Dynasty ruled a policy named Geumsan which means "the forbidden mountain". The kingdom released this regulation in order to establish the other palace and produced the ship and boat and others. Then, people can use anything outside of Geumsan (Jackson, Koehler: 2012:63). There are three kinds of mountain or forest needed by Joseon Dynasty:

- Gwanbang, the kind of mountain protected for national defense priorities.
- Yeonhae, the forest or mountain in the coastal area used to development, producing the ship, and coffin of the dynasty, and
- Taebong, the forest or mountain as a place for storing the placentas of royal family members

By this policy, the Royal had conserved and protected natural resources automatically.

## II. Intangible Aspects Of Joglo Pencu Kudus

### 1. LOCATION

The Complex of Joglo Traditional House is located in West Kudus District, Kudus City, Province of Center Java, Indonesia (<http://www.kuduskab.go.id/>). The terminology of Joglo Pencu refers to the Joglo traditional house with a protruding or towering roof in the middle. The uniqueness of this traditional house, beside eco-friendly, is plenty of carving motifs and decorative types influenced by Chinese, European, Hindu and Persian motifs. Each part of the traditional house has an idea reflecting the vision of the life of its inhabitants in dealing with nature, humans, and God.

### 2. PHILOSOPHY

The Community of Kudus has the same concept of residence with other java community. The significant of building a house is using guidance from Java Culture. As a part of java ethnic, they were strongly influenced by Java Culture. They were also affected by the Islamic religion. The Muslim society of Kudus people who follow Islamic religion created the house as a place to remember the God (Allah), life with the guidance of God, and stay away from the prohibitions of God. Even for loyal Muslims, the house is a place to worship God.

The ideal residence concept of Islam is a place that depicts an image of paradise which is a place providing a happy life, calm, peaceful, comfortable, cool weather, and still united with the natural environment (Sensa, 1987: 46). House, on java culture, is regarded as a microcosm from the inhabitant's view of the macrocosm (Mahar, 1990: 97). So, the design or embodiment of the house always uses the rules reflecting its view (Triyanto, 1992: 130).



Joglo Pencu Kudus (source: <https://mediaindonesia.com/>)

The philosophy of java considers the house, land, and human are inseparable unity. The humans are united with the

house and land where they stand and having an engagement with the village where they settled at the same time. Based on that view, java people consider that the house is an embodiment of his body while the human is an embodiment of his soul so that the house is an essential part of human life. Due to that fact, establishing the house should have the right policy in order that escaping the danger for its inhabitants (Reksodihardjo, 1982: 211). Based on that concept, establishing the Joglo Pencu cares for the direction of the house, time decision, selection of wood, and salvation or thankful rituals.

### **3. LOCAL INSIGHT ON JOGLO PENCU**

#### **a. Time Decision to Establish the Joglo Pencu House**

On the Java community, particularly in Kudus Region, building a house should consider the day called weton. This determination is related to their beliefs about the good and bad of a time. Time has a value considering the effect on something that has been done. They believe there is a good and bad day. Those times are believed to do a big or important activity. One example of a bad day is the day when the parent passes away. In the belief of the Javanese, this moment has bad value and it should not do a heavy activity such as building a house. This moment must be avoided in order to get disastrous in the future (Reksodiharjo, 1982: 217).

In addition, they also believe that there are bad months in constructing a building or house. The calculation of the month used by the traditional Kudus community is based on the calculation of the Hijriyah Year (Islamic Year) and the combination of Javanese-Islamic year. Both years are using the calculation of the moon revolution.

#### **b. Concept of Direction towards Joglo Pencu Houses and Response to Weather**

The cosmology of Java, on java culture, has horizon character (Geertz, 1981). It connects the cultural concept with the nature around it. According to this concept, the universe (consist of the world and all that in them, sun, moon, and stars) is understood as a huge place and is a static unity. This concept makes a human to construct the architecture based on the geometrical forms. Even the next development, the geometric becomes the dominant aspect of their architecture (Dewi, 2003: 34). In the geometrical room, humans also get experience and knowledge about orientation (Dewi, 2003: 32). Then it was born-the house orientation concept, including House of Joglo Pencu, for a variety of reasons. Traditional House of Pencu Kudus faces to the south with some reasons:

- The sunlight in the morning can perfectly enter inside the house so the health of people inside the house can be more guaranteed.
- On dry season which releases hot and humid weather, there is an adding roof called tritisan in front of the house.

Tritisian blocks the sunlight to the house so it is not directly exposed to sunlight and it remains well protected and producing cool air for its inhabitants.

- When the rainy season, the tritisian is in front of the house, it has a function to flow the rainwater and protecting the family inside the house. Most rainwater comes from the north and northwest so that the front of the house cannot be hit by rainwater gradually and it avoids the weathering of wooden which is the main component of Joglo Pencu.
- They believe that there are a smooth fortune and a long life for residents of the house

### **c. Selection of Timber**

The house that is able to survive in a long period of time certainly requires a strong construction, so we need a good quality type of building material (Ronald, 1990: 254). Java traditional house buildings, generally, use the kind of timbers from the teak tree (*Tectona grandis*), jackfruit tree (*Artocarpus heterophyllus*), coconut tree (*Cocos nucifera*), silk tree (*Albizia Chinensis*), and chinaberry (*Melia azedarach*) (Reksodihardjo, 1982: 123). In the case of Joglo Pencu, the majority of its construction are using the teak tree with good quality.

The teak wood is the best quality compared to other wood. Teak wood is superior in durability in house construction. Moreover, teak is also easy in the process and has a very good texture. The selection of teak wood as the main material of the house is not only because of the quality or economic status of the owner but also this wood, traditionally, is opined that has an excellent value and symbolic meaning which will be influenced by the owner of a house in the future.

### **d. System of Construction**

Joglo Pencu consists of three parts, head, body, and legs. Head is the cover of the house or roof while the Body is a wall of the house and the legs are the pillar of the house. The Structure of Joglo Pencu Kudus is applied as a tent or pulls system. Javanese people know this system as a "cathokan" and bird tail. The aim of this system is to anticipate the power of attraction. This structure system makes this house flexible in dealing with the earthquake. Joglo can reduce earthquakes due to the connection between structure and materials are not rigid. The same thing is also found in the connection between woods (Sudarwanto, Budi, 2012: 39).

Then, the connection system and the foundation of the joglo pencu kudas are using joint pedestals. The foundation of the pedestal is laid on solid or hard soil. This system does not use nails but utilizes the tongue groove system so that it can accept earthquake forces. The simplicity of such a traditional house construction system has a great function. This foundation makes the rigidity of the structure softened so that the system allows the building to harmonize the tremor of the earthquake that occurs on the ground level. This construction also makes the building pillars stronger against the earthquake. This construction must be supported by the good quality of wooden (Sudarwanto, Budi, 2012: 39).



### **e. Joint Construction**

The joint construction uses a knockdown system. Javanese people know this system as a “cathok” or “purus”. Knockdown construction consists of bulges and holes which connect or interlock each other. Similarly on the system of connection pillar on the pedestal also uses this system. In addition, joglo pencil also has a “purus” system abridging the people to demolish and to move the buildings. In java tradition, Javanese people often move around their location but still use the previous house material (Sudarwanto, Budi, 2012: 41).

To realize the structural elements into a full band as a whole by way of assembling and form craftsmanship, this requires skill and accuracy to create it. In this case, from the community experience, they build the character of Javanese church buildings rather than individuals, so they can be categorized as vernacular architecture. Due to the earthquake, it has been recorded by the Javanese community since the beginning. This is manifested in how to channel the lateral load to zero on the overlapping elements. So it can be said that the structure and construction system of the Javanese church with joglo character is flexible/resilient and is earthquake resistant building.

### **e. Traditional Conservation Method of Joglo Pencil**

The people of Kudus has their method to conserve their traditional house in order to be avoided from deterioration due to bacteria, lichen, mold, attack of termite or other pests. They are using emulsion made from a mixture of dried tobacco leave (*Nicotiana tabacum*), cloves (*Caryophyllus aromaticus* L), banana stem (*Banana Musa paradisiensis*), and gambier (*Uncaria gambir* Roxb) to varnish the wood surfaces. In some cases, they are only using the mixture of dried tobacco leave and cloves without the banana stem and gambier. This is the composition and process to make the emulsion:

1. 200 grams of cloves
2. Two or three pieces of gambier
3. 200 gram of tobacco
4. 200 gram of banana steam
5. Five liters of water
6. Boil all compositions in five liters of water until the water decrease into three liters to release the extract of those substances. Let stand the emulsion minimum of 24 hours and maximum 72 hours then it can be used as a treatment.

Considering this traditional emulsion, it has been found that it is used for many years and it is effective to protect the wooden house, the Borobudur Office, a center for Indonesia Heritage Conservation. They carried out the scientific research and found the compound of three substances is better than only one substance. It is because the three substances are effective to kill termites in dry wood. Scientifically, there are compounds of alkaloids in tobacco leaves

and the compounds of eugenol, eugenol acetate, and B-caryophyllene in clove and in banana steam (Parwoto and Gunawan, Arif, 2011: 20-33).

Generally, three of them have the chemical compound protecting the wood. Tobacco has nicotine. Nicotine is a powerful poison so it can kill and inhibit the attack of the termite of pest in dry wood. Nicotine also can survive in wood because it is not volatile and doesn't react to cellulose, hemicellulose, and lignin found in the wood so it does not damage the wood, it even brings out the original color of teak.

The other substance is clove which has an active eugenol substance. Eugenol is a derivative of phenol. Phenols are antiseptic as bactericides and fungicides. Cloves, in this emulsion, act as preservatives and reduce dirt or stains on wood. Another substance is gambier which also has a function as a preservative. However, the gambier preserves wood by preventing of wood deterioration due to fungus and bacteria. Gambir contains an active type of alkaloid named catechia or catechin. Catechins are bactericides and fungicides. The last substance is a dried banana stem. The banana stem maintains the original color, gluing wood fibers, and technically cleaning the dirt. (Swastikawati, 2012: 33-45)

## Discussion And Analysis

### Some Inspiration from Both Traditional Houses

Some local insights available on Hanok and Joglo Pencil Kudus are still relevant to be applied nowadays either applying directly or as a development in an adaptation. These local insights are not only beneficial for the owner of culture but also for other cultures. For instance, traditional or natural preservative emulsion, probably, can be applied directly for Hanok or other wooden buildings. Conversely, waterproof substance on Hanok probably can be applied directly for Joglo Pencil Kudus because these houses located in tropical area has a rainy season.

Afterward, some constructions on Joglo Pencil and Hanok have a purpose to pass up the earthquake, it can be developed further until its construction can be applied to a modern building. One of the modern constructions developed from traditional construction is Ondol which can be seen in a modern building in South Korea. Then, an earthquake-resistant building construction system in Japan also has similarities with traditional house constructions such as Joglo Pencil Kudus. Lastly, traditional wisdom can inspire people to create things that are more adaptable to recent conditions without detaching from its own culture and it still supports sustainable development.

The other local knowledge that I gained from Hanok is how Joseon Dynasty ensured the wood stocks for established palace and houses by ruled Geumsan (Forbidden Forest). This system has succeeded to provide a variety of timbers requires by the kingdom and society for centuries. Perhaps this regulation can be imitated and modified by the modern community for the forest conservation efforts. Then, much traditional wisdom from both traditional houses can be

developed and be applied. However, due to the limited knowledge of the author, the author cannot explain all the traditional wisdom.

## Conclusion

### Nature Influences The Architecture

The most important consideration in all processes involved in the establishment of Korean traditional house, started from site selection, planning framework, adding the roof, installing the windows and doors, is respect for nature. Based on the Korean traditional architecture view, nature is something that doesn't have to be conquered or dominated. That is a model and ideal standard for everything on human life. Even though the architecture is a human product, technology should respect the law of nature and the view of the natural environment should be brought into making houses as a part of nature.

Then, Pungsu is a knowledge system and advance value told that building sites and its orientation has to be in harmony with nature. The utilization of wood in traditional house construction optimizes natural materials. Ground walls and changhoji maximize the use of natural materials applied scientifically, and they are eco-friendly. When all these materials are taken from nature, they are used with sensitivity and based on advanced technology to maximize results. Nowadays, when the development of science and technology is evading the nature, it is necessary to learn the architecture of traditional house which care about nature and take some ideas to create a new sustainable house.

The same thing can also be found in Joglo Pencu Kudus. Climate is one crucial aspect of vernacular architectural design. Climate will directly influence the comfort of the inhabitant. Traditional house of Joglo Pencu located in a tropical area that has two seasons: the dry season and the rainy season. It has released the traditional wisdom from its people. The influential climate factors in this region are heat due to sun exposure, humidity, air movement as well as rain. Thus the design of buildings in the humid tropical area will refer to efforts reducing heat in the room, regulate the lighting, ventilation in order that achieving the optimal air movement and regulate the watercourse of rainwater.

Then the local communities understand how to preserve their houses from pest attacks. They created eco-friendly traditional herbal substance and it has been working to decelerate the weathering of their houses. This substance currently has been developed by stakeholders of cultural heritage conservation. The architectural insight of the community has been tested and has been inherited from generation to the next. How the architecture of Joglo Pencu Kudus responds to the climate challenges is important to be learned and probably it can be applied to the issue of tropical architectural design recently.

## Recommendation

### **The results of this study provide the following recommendations:**

- a) It is necessary to carry out the experiment of local knowledge which can be directly applied for traditional conservation substances from Joglo Pencu Kudus and waterproof substance of Hanok.
- b) It is necessary to create a simulation using computer software for some local knowledge that can be developed and combined in modern buildings
- c) Further research is needed to find out some local knowledge which is not yet known for its benefits in these two traditional buildings.

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## 자바(Joglo Pencu Kudus)와 한국의 전통건축이 담고 있는 무형유산적 요소 : 전통가옥의 사상과 토착지식에 관한 비교연구

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### 요약

본 연구는 인도네시아 전통가옥인 조글로 펜추 쿠두스(Joglo Pencu Kudus, 이하 '조글로')와 한국 전통가옥인 한옥이 담고 있는 사상과 토착지식 등 무형유산적 요소를 살펴본다. 연구를 통해 두 전통가옥 모두 자연 존중 사상을 기반으로 주변 환경에 순응하고 있음을 알 수 있었다. 한옥은 흙과 무더위를 견딜 수 있고, 조글로는 건기와 우기에 적합한 구조를 가지고 있다.

또한 한옥과 조글로는 자연에서 구할 수 있는 재료를 이용해 축조되고, 지진과 폭풍을 견딜 수 있도록 설계된다. 두 건축물은 지속가능한 발전에 기여하고 현재에 걸맞게 개발·적용될 수 있을 것이다. 특히 한옥의 천연 방수법, 조글로의 목재 보존법과 같은 토착지식은 오늘날에도 그대로 적용될 수 있을 것이다.

### 핵심 주제어

유산, 무형, 토착지식, 사상, 전통가옥, 전통건축