The Sundanese and Javanese House Local Wisdom to Respond to The Climate Changes

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Abstract. Climate change affects the ongoing seasons, including the season displacement, the outdoor thermal comfort, building usage, healthy space and the confusion in the building – infrastructure execution schedule. However, in a place like West Java or Middle of Java that condition do not work out because some local customs, tradition and nature condition give difference and specific characteristics (uniqueness) called Local Wisdom. Climate change also influences three elements in architectural discipline. There are nature as a place that influences the building, building in nature as human product to fulfill human necessity, and human as designer and user or occupant of the nature. Therefore, it is better not to oppose the climate change but to obey and fill the pursuit because those elements are linked to each other. Those reasons made author interested to do the research especially in Sundanese and Javanese traditional houses. The research objective is to proof the hypothesis that local wisdom influences the climate change in certain zone condition. The discussion referred to some theory like Lippsmeier’s and Triharso’s theories. The descriptive, qualitative, casuistic methodology used in this research. Results showed that adaptation endurance to climate change was possible through maintenance-preservation and conservation the traditional house as local wisdom and teaching the occupant to maintain together. The result become an architectural product and will be continued as new hypothesis in the next research.

Keywords: Climate Changes, Local Wisdom, Traditional House

1. Introduction
1.1. Background
Indonesia has many tribes, so that many traditional houses will be found, like vernacular stilt house in Sundanese represented by Kampong Naga housing complex and vernacular landed house as Javanese house in Middle of Java represented by Kampong Bade. The differences of vernacular typology house include the background of nature influence culture, local customs-traditions respond, building materials, a uniqueness and colors of architecture. That diversity is called local wisdom or genius loci.

In addition, the ongoing climate change also influences the three elements of architectural discipline, like nature as a place that influences the building, building in nature as human product to fulfill human necessity, and human as user or occupant or designer of the nature. Therefore, it is better to obey and fill the pursuit then oppose the climate change, because those elements are linked each other. The house
commonly has saddle rooftop model and the expansion, with a specific characteristic of detail, materials, and meaning. It depends on the location. The traditional house does not have an impact on the climate change. The Local wisdom defends and protects it, so that the background is to seek and solve the problem on how can local wisdom endure the climate change.

The object of the study was in Kampong Naga in West Java located in highway province between Garut - Tasikmalaya in Neglasari Village sub district Salawu approximately 25 km from Garut. The other object was Kampong Bade located in highway between Karanggede to Gemolong approximately 27 km from Gemolong- Karanggede district - Boyolali regency-Mid Java.

Each kampong has different uniqueness responding to the surrounding. Related to the weather climate and the geographical location, those objects were analyzed based on the aspects of micro climate, like the weather, nature, ventilation system, day lighting system, temperature and humidity. The table shown Kampong Naga had lower degree of temperature then Kampong Bade.

| No | Aspect over view | Kampong Naga | Kampong Bade |
|----|-----------------|--------------|--------------|
| 1  | Climate         | Tropical Humidity | Tropical Humidity |
| 2  | Seasons        | Dry and Rainy | Dry and Rainy |
| 3  | Geographical location of the object | 7° 56’ 49”- 7° 56’ 49” SL & 107° 25’8” EL | 7° 50’ 27”- 7° 56’ 49” SL & 108° 18’32” EL |
| 4  | Temperatures degree of the object | 21.5°C - 24.1°C (peak of dry seasons) in June 25th - 29th 2018 | 30.5°C - 32.8°C (peak of dry seasons) in April 25th – May 3rd 2018 |
| 5  | Humidity       | 70% - 80% | 40% - 60% |
| 6  | Temperature of comfort | 21.5°C - 24.1°C | 30.5°C - 32.8°C |
| 7  | Sun Light      | Clear and bright | Clear and bright |
| 8  | Day Light      | Clear & sometimes become overcast/cloudy | Bright, temporarily blinded |
| 9  | Air movement velocity | Breezy, temporary cool in the night & very cool in the early morning | Hot, sometimes warm & cool in the early morning |

1.2. Site Condition
Kampong Naga lies between the Singaparna hills and Karan Mount hills. Its slope is surrounded by steepness topography. In East side “Ciwulan” river flows along the village, used as sewage system, two springs are located in up of the two hills as drinking water resources and many rice fields and fishponds are used as livelihood inhabitant. The occupied houses, the tomb of grandparents Karuhun/ancestral...
Singaparna and the livelihood inhabitant are composed by an ordering system with the mosque and an “alun-alun” (little piazza) as a center.

Figure 3 & 4. Site Plan of Kampung Naga
Source: https://maps.google.com/and Journal of Kampung Naga by I. Indartoro (1987, pp 9)

Kampong Bade is also in slope slightly level land, in the beginning of the ‘Kendengs’ mountain range, separated into two areas: South side which faces the reservoir “Waduk Bade” and the North Side which faces a river “Kali Serang”. The site condition review aspects are topography and surrounding situation, house orientation, typology and house dimension, materials, construction elements etc. as shown below:

Table 2. Site Condition
Sources: Private document

| No | Aspect over view | Kampong Naga | Kampong Bade |
|----|-----------------|--------------|--------------|
| 1  | Topography      | 8° - ±45° slope slightly level land | 25° slope slightly level land |
| 2  | Surround situation | “Ciwulan” river in The East side | “Kali Serang” river in The West and North. “Waduk Bade” in Southwest part |
| 3  | House Orientation | Side by side in orderly to South or North | To North or South not in orderly, is dependent on the site form. |
| 4  | Typology and House Dimension | Stilt House, Square edge 6.00m x 6.00m or Rectangular 6.00 m x 9.00 m (6.00 mx10.00m). | Landed House. Rectangular edge 9.00 m x 12.00 m or 9.00m x 15.00 m |
| 5  | Construction element, Materials | Foot step foundation made by stone. The Body made by wood Manglid TYPE and bamboo. Roof made by Palm & Tepus Leaf. | Cube step foundation made by brick. The Body made by Teak Wood tree type (tectona grandis sp-teak wood/Jati).The Roof made by Corrugated Tile |
1.3. **Object Study**

1.3.1. **Sundanese House**

This Sundanese house was represented by housing typology in Kampong Naga. This study selected a sub village named Nagawir in Neglasari Village – Salawu District-Garut Region; West Java Province. It was easy access to reach the location, approximately 800 m from the slope downward.

The houses are stilt houses where usually the stilt houses have an optimal crossing air flow capacity because the distance between indoor floor surface and the ground can pierced by the crossing air flow. Those houses are assembled, facing to north or south, and not eroded by the influence of culture. The materials are bamboo & wood called “Manglid”. The roof shape is “Suhunan Jolopong “ (Gable) and covered with Palm and Tepus leaves, made the cooling air temperature of the room above possible. The shape and edges of the house are shown below.

The occupants always precede every activity with ritual and faithfully obey the rules of custom. The tradition is done enthusiastically, especially when they prepare materials for repairing the house, like praying to god, preparing food and beverage as tribute for the nature guardian.

![Figure 7. The house plan and elevation of Sundanese house in Kampong Naga](Source: private document)

![Figure 8 & 9. Sundanese house shape and edges](Source: private document)

1.3.2. **Javanese House**

Kampong Bade housing represented the Javanese house in a sub village (*dukuh*) that is located at the high way from Karanggede to Gemolong. It was easy to reach the location. Its highest level of the side is along the province highways that is ± 186 meter up to sea surface. Slope slightly appears on the land surface from the highway to north. The lowest site is in the South where slope slightly comes to the basin. There are many Jati (*tectona grandis* sp-teak wood) forests along the street. Climatic influences affect the landscape, buildings, air system and lighting system. The temperature...
was recorded on the average of 30, 5°C to 32, 8°C, and 26, 3°C to 28, 5°C under the densely vegetation area.

The houses are landed house, dispersed in North & South area, facing the north or south. The floor surface is topsoil, but several houses are covered with mortar. The roof is made of woods covered with corrugated tile. There are two types, namely:” Sinom and “Dorogepak”. The optimal crossing airflow capacity happened because the crossing airflow pierced the room in upper part and made the cooling air temperature above the room.

Everyone did the activity in the house or during the cultivate season. People always precede their activities with ritual’s conviction. They faithfully obey the rules of custom – tradition although the influence of culture alteration eroded several houses, new technology and materials, etc.

“Sinom” (the wide type) The house of Nyoto Widodo -Ds Pelang.

**Figure 10 & 11.** The shape and edges of house Type I “sinom” (along become wide)
Source: Private Document

**Figure 12.** Plan of type I “Sinom”
Source: private document

**Figure 13.** Section of house type I “Sinom”
Source: private document
Dorogepak (Stretch along a Length) type” The house of Mrs Sulastri’s - Ds. Bade

**Figure 14 & 15.** Shape and edges of house type II “Dorogepak (Stretch along a Length)”
Source: Private Document

**Figure 16.** The Plan of house type II “Dorongepak”
Source: private document

**Figure 17.** Section of house type II “Dorongepak”
Source: private document

2. Method
The research began with GOALS INVENTIONS as first hypothesis, found by study of the FACT and NEEDS (from Field Survey), worked in Survey Stage refer to the IDEAL CONCEPT (from Literature Survey). Then it used the theory (ideal concept), and matched with field survey in Analysis Stage. (Problem Seeking Step) Furthermore problem statement was examined to intervene the problem solving. As a result of discussion, many alternatives were nominated (Synthesis Stage). The last stage was to find the alternative problem solving, as an output of the research and then Conclusion or new hypothesis of the next research.
3. Discussion

3.1 Philosophy
Philosophy is a group of belief and the people way of behaving about the truth of everything, such as various reasons, rights and the basic way of thinking theory or logical activity, which contains logical metaphysics, epistemology and aesthetic. Kampong Naga and Kampong Bade occupants have their own uniqueness philosophy.

3.2 Local Wisdom
Local wisdom is defined as a basis of tradition and expressed in human creation that is culturally passed over generations of the community or tribes. Local wisdom is a physical and color of social cultural custom inhabitant condition that has a specialized local characteristic (Yudohusodo S, 1990). Using a new modern materials and technology is like to delineate a defiant attitude local wisdom by modernism (Haryanto B, 2012). Therefore, a local wisdom regarded as backwardness causes slow action. The Green Building Council of Indonesia (GBCI) stated that the green aspect is one of local wisdom requirements.

3.3 Village
It is a collection of residential buildings, as a communal-homogeneous with the physical condition of the hilly or flat topography and lay out of buildings. There are three types of villages: First, indigenous villages has traditional viscous nature, very strong relationship family culture, the ability to accept outside influences in low terms of maintaining authentic tradition and strong enough ecosystems relationship. Second, outskirts village (rurality) is the character as a heterogeneous settlement where some places are homogeneous, traditionally characterized by a sense of strong mutual help, located on the shores of the city and the buildings clustered solid enough. Third, village city (urbanity) is a community settled by the heterogeneous nature of the inhabitant, with very strong individualistic, high sense of competition where the nature of mutual assistance is less and the layout of the buildings is clustered very close no distance buildings.

3.4 The Traditional House
Traditional house is same as vernacular house. According to Bernard Rudofsky (1964) a vernacular house is an architecture form produced by local people to respect local ways of life and culture. It applies simply of technology as well as stabilizes local environmental resources by using local materials. Therefore, the name is the vernacular architecture product because of concerns to the local characteristic.

3.5 Climate and Seasons
Climate is the composition of the atmosphere and weather in the period in a particular area in certain places. It is divided into two climatic conditions, macro and micro. Macro climate is the climate that has the basic properties depending on the geographically location, sea level, coastal
conditions and wind direction. Micro climate is the climate in the air layer near the surface of the earth. Air movement is smaller or larger than temperature difference and the rough surface of the earth. The country climate depends on the natural environment principal and it is associated with an average temperature, humidity and season that creates characteristic. Indonesia located in the humid tropical climates have two seasons that are wet and dry. It has many tropical rain forests and savannas, rain with high humidity, high temperatures, a little wind, the small heat exchange with moderate to strong solar radiation. In the humid tropical climates the condition of the mountains generally have moderate temperatures and solar radiation greater than the lowlands where the temperature difference is quite high; cold in the morning, hot in noon, and heat frosty in night.

3.6 Climate and humidity
According to George Lippsmeier (1997) regarding the limit of comfort on the equator, temperatures range from 22.5°-30° C with a relative humidity of 20-50% during dry season and during wet seasons is around 22.5° C - 29° C with 80-100% humidity. The weaker wind blows when the higher humidity comes and the sun shines 12 hours per day (Sangkertadi, 2013). The characteristic of temperature in tropical humid climate is 27° - 30°C with humidity below 60%. The rainfall intensity should be low in dry seasons, then temperature is 23°-26°C humidity 70%-80% and rainfall should be high intensity. The temperature, humidity and rainfall should be controlled by using ideal ventilation system, wide aperture, gable/hipped roof top model, a wide roof terrace, as a backstop between exterior - interior spaces.

3.7 Healthy House
A proper house should have a good proportion of floor and site ratio, compatibility to the occupant number, comfortable space and compliance with the utility, including ventilation, daylight, outdoor-indoor temperature, vegetation, drink water resources, sewage drain and energy. It should include the renewable material and energy. The vegetation density and the building capacity should be arranged to get an ideal freshness living into the house.

3.8 Ecosystem
Ecosystem is reciprocal relationship of mutual influence between mortal invitation organism's environment and abiotic environment. Because each requires maintenance life then there is a balance between living beings. Natural ecosystems do not require maintenance or energy subsidies because each component can meet their needs and can be in balance. Therefore, as the natural inhabitants, the natural balance of the ecosystem associated with the environment in which we live in needs to be maintained.

3.9 System for the air flow
Natural ventilation is the intentional movement of air from outside to the inside of the building. Natural ventilation system is system for the air flow, the air changes naturally without the tools, or it is natural cooling the buildings by using the physical properties of the air to remove heat or cool. There are three types mechanism of natural ventilation: due to wind gusts, due to differences of the air and the effects of the hot air flow (Noor Cholis Idham, 2016). Using a system of cross ventilation is the best way by putting the openings positioned cross each other. The type, size and position of the window holes can also affect the natural ventilation mechanisms (Georg Lippsmeier, 1997). The human role is to solve the problem of solar heat entering from the outside of the building to be dominant in the humid tropical climates. Therefore, it should be noted that a high roof in a large of rooftop space volume with the space as ventilation holes on the roof can help reduce heating underneath space of the roof (Karyono Tri Harso, 2016). The tropical region with high humidity is part of tropical climate. One of the indicators is thermal comfort, thus humidity in the house should be controlled by natural ventilation. Aperture dimensions will affect
the airflow into the house. To receive natural ventilation the amount for living, dining room, kitchen is 20%, for bedroom 25 % and for toilet minimum 15 % floor area.

![Cross Ventilation](image1)

![Airflow in rooftop and space beneath the floor](image2)

**Figure 18. Cross Ventilation**
Source: Susan Clare Roaf, (2001.pp. 156)

**Figure 19. The airflow in rooftop and space beneath the floor**
Source: Tri Harso Karyono, (2016 p. 71).

### 3.10 Building Orientation

Structuring the mass of the building and building orientation produces a variety of effects on the movement patterns of air flow and air velocity (Tecky, 2014). Building orientation should be facing toward the North and South in order to receive a little more heat (Karyono T.H, 2016). The purpose of planning the orientation of the building is getting proper airflow to the room as well as the controlling. The arrangement of buildings on the site will also dictate the flow of the surrounding air, and the air around the site will be entered into every building.

### 3.11 Day lighting

Day lighting is the light comes from the sun (nature) that can be used to support day-to-day human activities. A room is not a room without natural lighting (Louis Khan in P. Manurung, 2012). The direct use of day lighting for houses is the major factor in a healthy and ideal living. Location factor becomes one of the effects to optimize the incoming sunlight (P.Manurung, 2012). The utilization of lighting during the day can be used with day light entering through the openings of windows, doors, openings or gaps that exist in the wall (wall board, woven bamboo walls, and others). Because the shelter does not require the level of illumination lighting in the room, generally it only requires 250 Lux (± 250 Lux in space can be used to write and read, Wahyudi Agung, 2012)

### 3.12 Discussion and Result

#### 3.12.1. Discussion

Traditional house is usually single layer floor, the floor up from the ground. For example stilt model from Sundanese house, the uniqueness characteristic is a distance between floor and the ground, named “kolong” (hollow space) where the distance depends on the topography soil condition. Related to the climate, hollow space makes the air flow in the alleys as a cooler of the space above. The bedroom (enggon) is a private area that needs a fresh air so it should be located in back side. A living room (tepas) is a public area that should be in front part. A kitchen (pawon) makes a dirty and hot air, thus the living room and the kitchen should be in front. The space between living room and the outdoor is called “golodo”, made from bamboo, used for sitting, smoking and chatting.
Kampong Naga is a native village, which has genuine local knowledge. The inhabitants still maintain the ritual ceremonies, the natural resources and living etiquette, like the regulation of housing orientation. Local wisdom in Kampong Naga is a custom and tradition from their belief or conviction in living regulation. People are very ritualistic, so when they intend to do something such as to repair, fall trees, to start trading, etc. they do the ritual if they have collided the regulation. The observation selected 12(twelve) houses in Kampong Naga that represented the Sundanese.

The houses floor In Kampong Bade usually landed into the ground without cover. They depended on the environment, nature, land typology, soil condition, local customs and tradition. People also have genuine local knowledge as native people. The inhabitants still maintained ritual ceremonies, like the house regulation. The settlements spread into many group (dusun), without assembling order. This study selected 15 houses in Kampong Bade to represent the Javanese house.
Table 3. Traditional Village Character
Source: Private Document

| No | Village's Name | Place | Accessibility | Character |
|----|----------------|-------|---------------|-----------|
| 1  | Kampong Naga  | The genuine name is Kampong Nagawir (the popular name is kampong Naga) in Neglasari village Salawu district Garut regency; | The location is easy to reach, between Garut-Tasikmalaya. | The permanent houses are not eroded by the culture, new technology and materials etc influence. The location is accessible. |
| 2  | Kampong Bade  | In the early decade people called Kampong Wates (cause there were two “wates” name in Karanggede & Simo district) then the government change Wates in Karanggede into “BADE” which means “kehendak” in Indonesian it means that people in this kampong have many “wish” to do something | The location is easy to reach, in highway Karanggede-Gemolong | Starting form ± 1995 (reformation era) many people went out/moved to big city to develop their knowledge, perspective, salary, so that after the people brought the new perspective, many of traditional houses are eroded by the influence of new perspective. |

Table 4. The object study requirement list
Sources: Private document

| No | Item for examine | Name | Material | Form |
|----|------------------|------|----------|------|
| 1  | Typology of house | Stilt or Landed | Wooden or bamboo | Square edges or rectangular edges |
| 2  | Foundation       | Pedestal/ Foot step form | Stone or Brick Covered or uncovered | Cube or flat Flat and square edges |
| 3  | Floor            | Top Soil or ground / plat form | Wooden or bamboo Wooden or bamboo | Pile or post Wooden plank or bamboo plaited |
| 4  | Colom            | Six or four main pillars | Wooden or bamboo | Rectangular plank or plaited |
| 5  | Walls            | Dividing Wall | Wooden or bamboo | Plank or lattice |
| 6  | Doors,           | Orifice edges | Wooden or bamboo | Rectangular / plaited |
| 7  | Window           | Shuttle or bar | Wooden or bamboo | Square |
| 8  | Ceiling          | 0n / off | Wooden or bamboo | Plaited of leaves or tile |
| 9  | Roof             | Saddle or pyramid roof | Wooden or bamboo | |
| 10 | Roof cover       | Organic or un organic | Leaves or Tile | |

The two traditional houses were examined by the list above. The positive and negative values of the houses were examined.

Kampong Naga had 32 positive points showing that the Sundanese house was held out from climate change. They had sturdy viscosity into the local wisdom although they were open to the newest information. Therefore, the local wisdom should be preserved as our cultural heritage. In the meantime kampong Bade should be preserved to eliminate the eroded swell.

3.12.2. Green Building aspect assessment

Green Building Council of Indonesia (GBCI) requires the GREEN ASPECT ISSUE to proof that a locus has an original uniqueness as local wisdom. Therefore, the object study reviewed as below is a breakdown of green aspect assessment.

Table 7 shows that total value of Sundanese house in Kampong Naga was more obedient to the regulation of custom tradition of green building aspect. The analysis from number
1,2,4,5,6 assessment item showed that the Sundanese house in kampong Naga scored higher than Javanese house in kampong Bade.

**Table 5. Green Assessment for Tradition Village & Houses**

| No | GREEN ASSESSMENT | Kampong Naga | Kampong Bade |
|----|------------------|--------------|--------------|
| 1  | Appropriate Site Development (ASD CATEGORIES) | 25 | 24 |
|    | Energy Efficiency & Conservation (EEC CATEGORIES) | 15 | 11 |
| 3  | Water Conservation (WAC CATEGORIES) | 9 | 9 |
| 4  | Material Resources and Cycle (MRC CATEGORIES) | 28 | 25 |
| 5  | Indoor Health and Comfort (IHC CATEGORIES) | 19 | 18 |
| 6  | Building Environment MANAGEMENT (BEM CATEGORIES) | 23 | 18 |
|    | TOTAL VALUE | **119** | **105** |

3.12.3. Structural element

The main structure used dowel and hole to connect the construction element in unrigidly frame. It is the best system to respond the building from earthquake and support the building load constantly.

a) Burden roof model; name “Suhunan jolopong” made by bamboo, covered by Palm fiber leaves (organic)
b) Wall made by bamboo plaited; Flat & square edge; dimension 3.00x300x400cm
c) Shuttle Window with bars lattice work made by bamboo.
d) Pedestal Foundation name “Umpak”; made of stone, cube edges; dimension 30x30x60 cm

![Figure 24 & 25. Structure Elements of Sundanese and Javanese house.](Source: Private Document.)

4. Conclusion

Apparently the traditional houses that followed the local wisdom can hold out the climate change influence, proven by:

**Table 6. The Conclusion (product of problem solving)**

| No | Examine Item | Theory | Sundanese House | Javanese House |
|----|--------------|--------|-----------------|----------------|
| 1  | Philosophy   | Base on the meaning of philosophy: The occupants have their own unique philosophy. | Kampong Naga belongs to Kampong Bade as Outskirts |
| 2  | Village      | Village characteristic theory: Kampong Bade | Kampong Bade as Outskirts |

Source: Private analysis
| No | Examine Item | Theory | Sundanese House | Javanese House |
|----|--------------|--------|----------------|---------------|
| 3  | Traditional House | Bernard Rudofsky theory: And Agung Wahyudi and C Widi Pratiwi | Stilt house type, Square and Rectangular edges | Landed house type, Rectangular edges |
| 4  | Healthy House. | Karyono T.H’s theory: | Sundanese house: Have a good ventilation, daylight, outdoor-indoor temperature, vegetation, ideal freshness living into the house, energy efficiency, renewable material | Javanese House Have two types of shapes and edges of rooftop "Sinom" and "Dorogepak" make the crossing airflow pierce the room in upper part. |
| 5  | Ecosystem | Heinz Frick dkk theory: Natural ecosystems do not require maintenance or energy subsidies because each component can meet their needs and can be in balance. | The object located in kampong Naga in the humid tropical climates has wet & dry seasons, between two mountains. The temperature is chilly in the morning, warm in noon frosty at night. Humidity 70% - 80% | The object located in kampong Bade in the humid tropical climate with two seasons, wet & dry, a little wind, rain with low humidity, high temperature The heat exchange with moderate to strong solar radiation. The temperature is quite high; cold in the morning, hot in noon and night. Humidity 40% - 60% |
| 6  | Climate & Seasons. | Georg Lippsmeiër’s theory: Climate is the composition of the atmosphere and weather in the period, in a particular area, in certain places. Air movement is smaller or larger than temperature differences & the rough of earth surface. | Refer to table 1 Micro Climate & Weather no 9. The temperature is chilly in the morning, warm in noon frosty at night. Humidity 70% - 80% | Refer to figure 22. Shuttle or bar, lattice form Aperture dimensions, amount minimum 15 % to 25% floor area. |
| 7  | Building Orientation | Karyono T.H’s theory: | Related to table 2. Site Condition no 3. House Orientation: South or North, side by side in orderly. | Related to table 2. Site Condition no 3. Face to North or South, depend on the site form, not in orderly |
| 8  | The air flow system: *Ventilation | Georg Lippsmeiër’s theory: a system of cross ventilation is the best way | Refer to figure 22. | Refer to figure 24 |
| 9  | Day lighting. | Louis Khan’s theory in P Manunung : P. Manunung’ theory : Wahyudi Agung theory : | Refer to table 1 no 7and no 8. Aperture dimensions: amount (wide) 60 cm x (high) 120 cm for window and (wide) 70 cm x (high) 210 cm for door. | Refer to table 1 no 7 and no 8. Aperture dimensions: amount 2 x 60 cm (wide) x 20 cm (high) for window and 80cm (wide) 210 cmx (high for door |
| 10 | Local Wisdom | Siswono Yudohusodo Theory: The Green Building Council of Indonesia (GBCI) | The Sundanese house showed how deep fidelity to custom and tradition | Javanese house consistently implementation & maintain the living regulation community |
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