

# Identification of South Sumatra Province's Local Wisdom as Science Literacy Objects

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## Identification of South Sumatra Province's Local Wisdom as Science Literacy Objects

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### Abstrak

Kemampuan para siswa Indonesia dalam bidang fisika masih tergolong rendah. Berdasarkan PISA 2018, Indonesia menempati urutan ke-62 dari 72 negara peserta. Hasil tersebut jauh lebih rendah daripada negara-negara Asia lainnya. Sehingga masalah tersebut harus segera diatasi. Salah satu sumber literasi fisika yaitu kebudayaan lokal. Kebudayaan lokal dapat digunakan sebagai sumber pembelajaran fisika bagi para siswa untuk meningkatkan kemampuan mereka.

Sehingga, pada *paper* ini penulis mendiskusikan tentang beberapa kebudayaan di Sumatera Selatan yang berpotensi sebagai objek nyata dalam pembelajaran fisika. Beberapa kebudayaan tersebut yaitu kapal otok-otok dan kemplang panggang yang dapat digunakan sebagai objek kajian materi kalor atau transfer panas, dan rumah tradisional Limas dan Baghi yang dapat digunakan sebagai media pembelajaran gaya, massa, beban, dan modulus elastisitas. Objek literasi merupakan sarana yang dapat digunakan oleh para guru dalam menyampaikan materi fisika. Melalui literasi berbasis kebudayaan lokal, diharapkan peringkat PISA Indonesia dapat meningkat. Bukan hanya itu, hal demikian diharapkan pula dapat meningkatkan kemampuan generasi muda Indonesia dalam bidang fisika.

**Kata Kunci:** *Kebudayaan Lokal, Literasi Sains, PISA.*

### Abstract

The ability of Indonesian students to master physics is still low. Based on PISA in 2018, Indonesia ranked at 62<sup>th</sup> out of 72 participating countries. It was much lower than other Asian countries. Therefore, this problem should be overcome. One of the existing sources of physics literacy is local wisdom. The local wisdom can be used as a direct source of physics studies for students to increase their literacy skills. Therefore, in this paper, the authors discussed some local wisdoms in South Sumatra Province that potentially used as physics literacy objects for students in their school. South Sumatra has many local wisdoms potentially used as real objects in physics studies for students. Some of the local wisdom as otok-otok boat and roasted kemplang can be used as the object of heat transfer studies (thermal), and the traditional houses of Limas and Baghi can be used as media for learning force, mass, load and modulus of elasticity. The objects of literacy studies are sources of study that can be used by teachers in teaching physics. Through local wisdom-based literacy, it is certainly expected to improve Indonesia's PISA ranking. Not only to improve PISA ranking, but it is also increase the superiority of the nation's future generations.

**Keywords:** *Local Wisdom, PISA, Science Literacy*

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## PENDAHULUAN

Science literacy has started in 1950 introduced by Hurd, Mc Curdy, and Rockefeller Brothers Funds in 1958 (DeBor, 2000), Indonesia's science literacy began in 2000 through the *Program for International Student Assessment (PISA)*. This activity was organized by Organization for Economic Cooperation and Development (OECD) which is held regularly every three years. PISA aims to provide an overview of the success of educational policy and practice and monitor student's skills and abilities in each country with a different demographic (OECD, 2019). In 2018 there were 79 countries including Indonesia as one of the participants of PISA, there are three evaluation students in PISA as reading, mathematic, and science (OECD, 2019).

Indonesia's ranking in the PISA program tends to decline, in 2015 the number of students taking the PISA assessment was close to 540,000 students, representing 29 million students aged 15 years from 72 participating countries. Based on the review of PISA results, Indonesia's ranking in the three competencies was better than in 2012. However, Indonesia was still far below other Asian countries, such as Singapore which was in the first position, and Japan in the second position. Out of 72 countries, Indonesia ranked 62th. In the implementation of PISA in 2018, Indonesia ranked lower than in 2015. Indonesia was below the OECD average. PISA 2018 results showed the fact that Indonesia is in the Low quadrant, and there is an imbalance in learning performance between men and women. This condition is one of the problems in Indonesian future generations (Kemendikbud 2019; OECD 2019; Schleider 2019). Science literacy is an essential program for current and future generations (Mahmudah et al., 2020). Science literacy is the ability to understand matters related to science and reflective ideas around science (Rahmania et al., 2018; Schleider 2019). Science literacy is the ultimate goal in science learning for school students aged 15 years (OECD, 2019).

Physics is a science that studies the symptoms of nature in terms of its matter and energy. Physics is the build of knowledge that describes the collective effort, findings, insights, and wisdom (Wartono, 2003:18). Meanwhile, according to Mundilarto (2010:4), physics as a basic science has characteristics that include the build of science consisting of facts, concepts, principles, laws, postulates, theories, and scientific methodologies. Physics is very closely related to everyday life, a simple example that is often encountered is the natural event of the presence of falling fruit will go down this by the concept of gravitational forces studied in physics. On the other hand, physics also explains the activities carried out by the community. Unwittingly, physics contributes to community activities that can be explained through science literacy. An example is the presence of solar energy to dry clothes.

A decision can be made by thinking about causation based on the involvement of scientific knowledge. It is also called local wisdom. Local wisdom is local ideas that are thoughtful, valuable, embedded, and followed by members of the community. Local wisdom in anthropological terms is known as a local genius. Haryati Soebadio said that local wisdom is the cultural identity. It is the identity of the nation's culture that causes the nation to absorb and cultivate foreign culture according to its character and ability (Sartini in Ayatrohaedi, 1986).

Based on information brewed from the Catalog of South Sumatra Province In Figures 2020 the Central Statistics Agency (BPS) of South Sumatra Province (BPS, 2020) informed that South Sumatra consists of 17 regencies/cities consisting of 13 districts and 4 cities, 13 regencies including Regency of Oganm Komeri ng Ulu (OKU), Ogan Ilir (OKI), Muara Enim, Lahat, Musi Rawas, Musi Banyuasin, Banyuasin, Ogan Komeri ng Ulu Selatan, Ogan Komeri ng Ulu Timur, Ogan Ilir, Empat La ng, Penukal Abab Lematang Ilir (PALI), Musi Rawas Utara, and 4 cities including Palembang City, Prabumulih City, Pagar Alam City, and Lubuk Linggau City. Each district and city has a pearl of different local wisdom. Local wisdom is in the form of food, clothing, buildings, and others. Some local wisdom of South Sumatra is Kemplang, Otok-Otok boat, Limas traditional house, and Baghi traditional house. Local wisdom has a scientific explanation. For instance, Limas traditional house was built using wood installation, without realized by the surrounding community that it is a piece of scientific knowledge. It is an anti-earthquake house because elastic modulus can withstand forces on the left and right. Therefore, local wisdom can be used as science learning objects in schools. It supports the efforts of the Indonesian education system and the wishes of the Organization for Economic Cooperation and Development (OECD) so that students can apply their knowledge to real-life objects directly.

11 There were some reports reported local wisdom as a scientific discussion. The development of physics students' books based on local wisdom (Majalabodahu) in MAN 1 Bima city was discussed by (Atabikrifki, et al., 2018). The development of the Physics Module Integrat Local Wisdom upstream of South River was reported by (Wati, et al., 2016). The development of Physics Comics based on Palembang's Local Wisdom in High School was also discuss by (Wahyuni & Lia, 2020). Therefore, in this paper, the authors discussed South Sumatra Province's local wisdom as science literacy object to increase students' ability in physics.

## METODE PENELITIAN

This research is descriptive qualitative research. It explains how a phenomenon occurs and what the characteristics are (Nassaji, 2015). In this type of research, the author obtained data from several secondary sources. They are needed in the analysis process to provide in-depth research results and analysis. Fundamentally, this method relies heavily on researchers in observing the object of research (Rahmat, 2019). This study was a literature study as an approach in obtaining the required data. Through this research design, it is possible to find references as much as possible from various data sources, such as journals, books, scientific articles, and others related to the topic. The data obtained from the literature study processed systematically so that the data can be used as conclusions and provide answers to the formulation from problems (Supriyadi, 2017). The data used in this research is secondary data. Secondary data are including books or journals related to the topic. Secondary data can be used when there is time and space limitation to provide opportunities for researchers to find out something that has happened in the past (Rahmat, 2019).

Based on the ty of qualitative research, there are several stages in analyzing the data. The data analysis includes data collection, data reduction, data presentation, and concluding (Dull & Reinhardt, 2014). The first stage is the data collection process. Researchers obtained data from several data sources, both in the form of text and images, and took pictures directly in the field. Furthermore, the



second stage is reducing data. This stage is a process in which the researcher selects and sorts data into specific categories, specific concepts, and related to the research topic. Reducing data also be done by summarizing data, coding, then exploring the research topic. The next stage presents the data related to activities when researchers compile data until they can provide conclusions. The last stage is to make a conclusion (Rijali, 2019).

## HASIL DAN PEMBAHASAN

### 1. Otok-otok Boat

The Otok-Otok boat is one of the traditional games that successfully identified in South Sumatra (Ibrahim et al., 2019). This boat is called the Otok-Otok boat because of the sound it makes when it is played. Although known as a kind of traditional games, the Otok-Otok boat became very popular in the first half of the 19<sup>th</sup> century and even started being manufactured in many countries (Taha, 2016).

According to Aginza & Sattar (2016), the Otok-otok boat has about 20 cm in length, 5-6 cm in width, and 4 cm in height. The Otok-otok boat has a form of a simple battleship with weapons and exhaust that can be made of aluminum or zinc. The Otok-otok boat can reinforce the spirit of nationalism as these toys are usually painted red and white or have additional accessories in the form of a red and white flag (Agustina et al., 2019). The Otok-otok boat is not only able to increase nationalism, but it also contains cultural, historical, educational, and aesthetic elements (Judianto & Saputra, 2018).

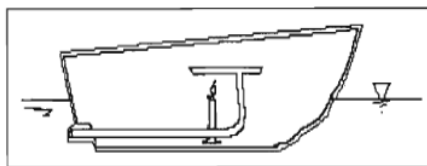


Figure 1. Otok-Otok Boat (Sharadha & Arakeri, 2004).

Based on the engine type, the Otok-otok boat is categorized as a simple type of steam engine that has no moving parts and requires heat as a source of energy (Figure 1). This type of machine was first patented in 1891 by a French technician, Désiré Thomas Piot (Taha, 2016). According to Crane (1997), the Otok-otok boat itself was first patented by an English technician in 1897. Although the Otok-otok boat requires heat as a source of energy, this toy is not powered by a conventional heat engine, but rather by a motor that can be described as the pulsating water jet engine (Sharadha & Arakeri, 2004).

The movement mechanism of the Otok-otok boat can be explained by simple physical principles. Otok-otok boat always has a small shallow chamber covered with a thin copper-based diaphragm. This part is then connected to the rear of the boat with two of 3 mm pipes bore. The two pipes, the edges of which are in contact with water, simultaneously become a place where the chamber is heated with a candle or other source of the fire. The vibrations emanating from the diaphragm and the forward movement of the boat then cause the characteristic Otok-otok sound. The Otok-otok boat will continue to operate as long as the flame in the chamber glows (Sharadha & Arakeri, 2004).

Based on the principles of physics (Figure 1), the Otok-otok boat uses the heat flow by using the steam drive that comes from a mini boiler installed on the

boat. When it is played, the temperature in the boat's surroundings is lower than the temperature inside the boat, so that the water vapor in the boat is pushed out and exerts an action force on the water (Agustina et al., 2019). Indeed, this principle can be reviewed using Newton's third law of motion, which explains for every action force, there is an equal and opposite reaction force (Judianto & Saputra, 2018).

According to Agustina et al. (2019), the temperature measurement with a thermometer on the Otok-otok boat showed that the temperature before the Otok-otok boat being operated differs from the temperature when the boat was being already heated by a candle. The temperature of the Otok-otok boat before being operated was 20°C. Meanwhile, after the Otok-otok boat was being operated for 2 minutes, the temperature rose to 50°C. Based on this phenomenon, it can be seen that the applied concept of physics in the boat is the convective heat transfer. This concept can be expressed by the following equation

$$H = \frac{Q}{t} \tag{1}$$

Where  $H$  is the heat transfer rate,  $Q$  is the amount of heat, and  $t$  is the time of heat being transferred. To determine the differences of the temperature, the previous equation can be differentiated to

$$20 \quad H = h A \Delta t \tag{2}$$

Where  $h$  is the convective heat transfer constant,  $A$  is the cross-sectional area, and  $\Delta t$  is the temperature change. According to Taha (2016), the propulsion mechanism that generates otok-otok sound applies the principle of thermodynamics.

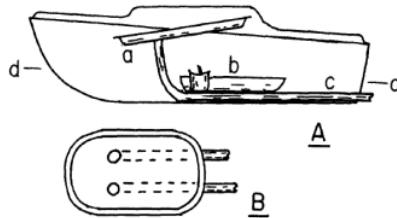


Figure 2. Otok-otok Boat Structure: a. Vertical Section, where a is the Boiler, b is the Candle or Fuel Pellet, c is the Pipe, and d is the Approximate Water Line. B. Clearer Appearance of the Boiler (Crane, 1997).

A heater under an insulated boiler (which is initially filled with water) is installed on the Otok-Otok boat. When water is heated, it quickly turns into steam (Figure 2). This naturally increases the pressure inside the boiler, which allows the steam to flow into the pipe. Besides, this process pushes the water out of the pipe as a jet and it can propel the boat forward. However, when the generated steam encounters a colder surface, it condenses back into the water. This condensation simultaneously reduces the total volume and the pressure in the boiler. The difference of pressure reverses movement, allowing the water to return to the hot boiler which instantaneously produces steam and the cycle can be repeated. For the propulsion can be produced continuously, the evaporation rate must be close to the condensation rate (Taha, 2016).

Based on this explanation, it can be seen that the correlation between physics and traditional games and local wisdom is very close. This is because physics is one of the areas of ethnoscience and a branch of science that studies natural

phenomena such as material, people, and the interactions between people and other materials. Hence, physics is considered useful for the development of technology, innovations, and other sciences. Besides, people generally interpret the experienced phenomena according to the beliefs that develop in that environment. This method is one of the so-called indigenous science of society. The indigenous science of the society is reflected in the local wisdom as an understanding of nature and culture that develops in the society (Azhar, 2008).

## 2. Roasted Kemplang

Tebing Gerinting Utara Village is one of the villages located in Indralaya Selatan District, Oganllir Regency, which is one of the centers for producing kemplang crackers. Tebing Gerinting Utara Village has an area of 184 hectares with a population of 1823 people and there are approximately 408 heads of families, of which around 180 families have a home industry business of kemplang cracker production. (Ariansyah et al., 2012). Kemplang ogan ilir or better known by the local community as kemplang tunu is a fish-based food (Terttiaavini et al., 2019) (Figure 3). Fish that are commonly used are river fish or sea fish. The term "tunu" in kemplang means grilled kemplang. This local wisdom goes through the drying and roasting process.

The drying and roasting processes of kemplang are the main processes that determine the crispiness of the kemplang. Before heading to the roasting process, the kemplang must be dried in the sun for about an hour. This aims to reduce the water content in the kemplang so that it expands faster when roasting. Charcoal as a baking ingredient is put into the furnace to make coals. After the coals are evenly distributed, the dried kemplang will be placed in nets. The nets are directly above the stove. This process can be seen in Figure 3 (a).

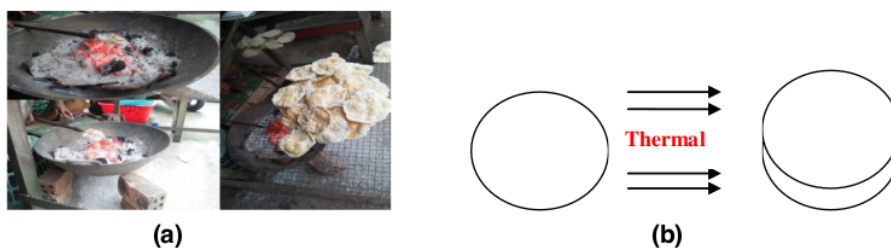


Figure 3. (a) The Process Of Roasting Kemplang and (b) Kemplang Expansion After Being Given Heat

When roasting, kemplang will get heat in the form of heat energy for expansion or expansion. The kemplang will experience expansion in each dimension of the kemplang, both the increase in length (diameter of the kemplang), area of the kemplang, and volume of the kemplang (Figure 3 (b)). A solid when given heat will expand. Heat is energy transferred from one system to another due to temperature differences. The temperature of system I (kemplang) is much lower than the temperature of system II (furnace), which causes heat transfer.

According to (Tipler, 1998), heat is energy that is transferred from one object to another due to temperature differences. When a substance is given heat energy, the temperature of that substance will rise. The amount of heat energy  $Q$  required to increase the temperature of a substance is proportional to the change in temperature  $\Delta T$  and mass of the substance (Equation 3) (Mosca, 2007).

$$Q = m.c.\Delta T \quad (3)$$

In addition to the kemplang roasting process which involves the concept of physics, handle the grilling kemplang (stick). the public has thought so that the conduct of heat is not directly felt by the hands of the grill. The grill handle can be iron or wooden (Figure 4). It can be seen in table 1 that iron has the lowest conductivity among other metals (except steel), and oak or other types of wood also have low conductivity.



Figure 4. Kemplang Roasting Stick

Thermal conductivity (table 1) is a coefficient that shows the conductivity watts per unit length and temperature. Conductivity depends on the composition of the material. The existence of conductivity indicates that the conductivity of heat through an intermediate substance (conduction) occurs (Inogamov & Petrov, 2010). Conduction transfer explains that thermal energy moves through interactions between atoms or molecules without moving the atoms or molecules themselves (Tipler, 1998). In addition to the kemplang which gets the energy to expand, the energy from the hot coals also flows to the kemplang roaster.

Table 1. Thermal Conductivity of Various Materials (Tipler, 1998)

Material	k,W/m.K	k, Btu.in/jam.ft <sup>2</sup> . °F
Air (27 °C)	0,026	0,18
Ice	0,592	4,11
Water (27 °C)	0,609	4,22
Aluminum	237	1644
Copper	401	2780
Gold	318	2200
Iron	80,4	558
Lead	353	2450
Silver	429	2980
Steel	46	319
Oak	0,15	1,02
White Spruce	0,11	0,78
Concrete	0,19-1,3	6-9
Glass	0,7-0,9	5-6



When the end of the grill gets energy, then this energy vibrates the atoms on the end of the grill along the length of the grill. Therefore, the smaller the conductivity, the smaller the rate of energy flow from end to end of the rod (see equation 4). This results in people roasting the kemplang not feeling or feeling a little hot.

$$I = \frac{\Delta Q}{\Delta t} = kA \frac{\Delta T}{\Delta x} \quad (4)$$

With  $I$  thermal current;  $\Delta Q$  the amount of thermal energy that is conducted through the slice. stem;  $\Delta t$  time;  $k$  coefficient of thermal conductivity;  $A$  surface area;  $\Delta T$  temperature difference in the cut; and  $\Delta x$  stem length (Serway & Jewett, 2004).

### 3. Limas and Besemah Traditional Houses

Indonesia is located at the confluence of tectonic plates such as the Indo-Australian plate, the Eurasian plate, and other small plates. Some islands as Sumatra and Java are formed due to the subduction of the oceanic crust under thick and old continental plates (Katili, 1975). If deformation occurs in a subduction zone, the disaster that usually occurs is an earthquake with a tsunami (Patria & Aulia, 2020). The Indonesian people already know the effects of the earthquake, including their ancestors. As a result of this natural phenomenon, the ancestors created thought to protect themselves and their families which was manifested through the traditional house (Projitomo in Sulistijowati, 2016).

At first, traditional houses were used as shelters from wild animals and natural phenomena (earthquakes). In general, there are two types of Houses, the traditional and modern houses. The Indonesian archipelago architecture was built for two seasons, while European architecture is for four seasons. Traditional houses used organic building materials, while European architecture uses inorganic materials. Moreover, Traditional houses were oriented towards earthquake-resistant construction (Projitomo in Sulistijowati, 2016). The traditional houses as the traditional Nias house used wood as the main material to withstand earthquakes (Bramantyo, 2012). Also, the construction of a Gadang house is earthquake resistant (Oktavia & Prihatmaji, 2019). The purpose of earthquake-resistant building construction is to minimize damage given to the building from seismic activity (Kaushal, 2014).

South Sumatra has various traditional houses (figure 5), such as the limas house, the limas warehouse, and the raft house. The types of houses are influenced by the geographical area which is covered by rivers (Siswanto, 2019). The traditional house of South Sumatra is known as *Rumah Limas*. The name "the limas house" is given because of the house shape. The walls, floors, and doors of the pyramid house usually use tembesu wood, while the house poles used water-resistant wood, unglen wood (Wahyuni, 2015). Apart from the limas house, Pagaralam is an area of South Sumatra that also has a traditional house, Besemah house. The Besemah tribe designed the traditional house with the concept of earthquake resistance.



(a)

(b)

Figure 5. (a) Limas (Wahyuni, 2015) and (b) Besemah (Baghi) Traditional Houses

Traditional Indonesian houses are predominantly using natural materials such as wood and bamboo. Bamboo has good tensile strength and load-bearing capabilities compared to other materials (Ogunbiyi et al., 2015). Meanwhile, wood has a load-bearing strength that triggers breakage and has elasticity properties that determine the shape of the wood from its original state when it is given a load (deformation) (Desch & Dinwoodie, 1996). As the load-bearing, wood has a modulus of rupture which determines the strength and elasticity modulus associated with wood stiffness (Missanjo & Matsumura, 2016).

Elasticity  $E$  is the ability of objects to return to their original shape after being given a force or load (Serway, 2009). An elastic object has three states. Suppose the elastic object is wood. When the wood is given a load, the wood is deformed and can still return to its original state shown by a linear line. Wood also has a limit of elasticity. If wood receives a load that exceeds the elasticity limit, the wood will experience permanent deformation or fracture. The constant of a piece of wood is reflected by the value of  $E$  (Desch and Dinwoodie, 1996).

$$E = \frac{\text{stress}}{\text{strain}} = \frac{\sigma}{\epsilon} = \frac{\frac{\text{Force}}{\text{Surface Area}}}{\frac{\text{Deformation}}{\text{Original Length}}} = \frac{F}{\Delta l} \quad (5)$$

The elasticity value of each material, including wood, can be seen in table 2. The force itself changes the shape of the object, the direction of the object, the object's velocity, and the motion of the object. During an earthquake, the building will acquire a force. Earthquake resistance factors of a building include balance, robustness, and elasticity (Rinaldy et al., 2015).

Table 2. Value of Elasticity Modulus (Fachrurrozy, 1994).

No.	Material	E (kg/cm <sup>2</sup> )
1	Steel	2.100.000
2	Concrete and reinforced concrete	210.000
3	Wood: paralell to the fibers	125.000 (kl. I)
		100.000 (kl. II)
	Perpendicular to the fibers	125.000 (kl.I)
		100.000 (kl.II)
4	Pairs	20.000

Table 3 shows that wood has a high-stress value, except for Steel St.37. The values of bending stress, tensile stress, pressure stress, and shear stress in the wood can anticipate deformation caused by the earthquake. Construction of earthquake resistance building with wooden materials must pay attention to 3 main things, choosing the type of wood with a high level of strength and durability, planning the dimensions of the logs, and planning the wooden joints by considering the forces that occur during an earthquake (Fachurrozy, 1994).

Table 3. Strain Values Of Various Materials (Fachurrozy, 1994)

No	Material	Stress		
		$\delta l$	$\delta t$	$\delta d$
1	Steel St.37	1200	1200	1200
2	Granite	-	-	45
3	Natural stone	-	-	35
4	Brick – PC	-	-	6
	- lime	-	-	4
6	Reinforced concrete *)	-	-	25
7	Marble	-	-	20
8	Wood : I Class	150	130	130
	II Class	100	85	85
	III Class	75	60	60

Note:  $\delta l$  (Bending Stress);  $\delta t$  (Tensile Stress);  $\delta d$  (Pressure Stress)



Figure 6. (a) Structure of Basemah House (modified from Rinaldi et al., 2015) and (b) Destroyed building Caused by Earthquake (Murty, 2005)

In the construction of a traditional Besemah house, the mass of wood must be considered. There are mass differences of wood in the lower, middle, and upper parts of a construction. As the construction goes up (bottom to top), the mass of wood tends to be relatively light (Figure 6 (a)) (Rinaldi et al., 2015). The construction of the bottom (foundation or floor) gets a greater inertia force that accumulates from above (Murty, 2005). Figure 6 (b) shows that the higher the building, the greater the total horizontal force of the earthquake. The difference of wood mass in the arrangement of the parts of the house aims to maintain balance in distributing forces or loads during an earthquake.

In addition to the mass of wood being considered, wooden joints also contribute to reducing earthquake forces. The wooden joints with a knockdown system or connections without nails or pegs have a higher resistance to earthquakes. When wood receives dynamic loads such as wind and earthquakes, the wood response is influenced by the attenuation properties of the energy located at the joint (Salman & Hussain, 2010). Plastic deformation can be overcome

through gaps in wood joints (Tanabashi, 1960). Wooden joints without supporting tools such as in a camping house or a pyramid house are known as dental joints. This connection takes into account the area of the wood contact area for load distribution (Mulyati, 2015). The joint pole of Baghi or Besemah traditional house is shown in figure 7 (a).

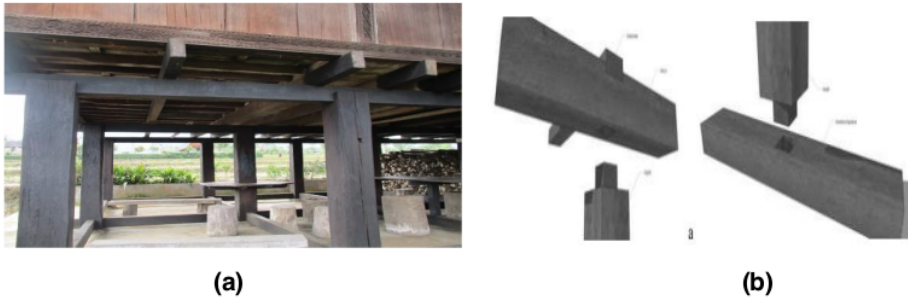


Figure 7. (a) The Joint Pole of Baghi/Besemah Traditional House and (b) Sako Pedestal on Foundation and Floor (Nasution and Prasetyo, 2016).

Figure 17 (b) shows the Sako supports or poles without nails. Installation of the pyramid house sako aims to reduce the activity of the moment of force or torque (Nasution & Prasetyo, 2016). The mass distribution of asymmetrical construction and asymmetrical load-bearing elements causes torsion when an earthquake occurs (Agnostopoulos et al., 2013).

Partikel (elektron) diletakkan di dalam sebuah kotak (kubus), maka dinding kotak tersebut akan menjadi simpul yang membatasi elektron, semakin kecil ukuran kotak (kubus) tersebut maka energi elektron akan semakin besar. Jika ukuran kubus sangat besar maka nilai energi partikel (elektron) juga sangat kecil sehingga tingkat energi dan spektrum energi partikel dalam kotak akan tampak kontinu. Hal ini yang disebut sebagai *electron confinement*. *Electron confinement* pada material akan mengubah sifat-sifat material secara fundamental (Phillips & Mandl, 2003).

## KESIMPULAN

Local wisdom of South Sumatra Province is potential source of scientific literacy. Otok-otok boat can be a medium for scientific literacy in physics material regarding the heat transfer process, roasted kemplat<sup>1</sup> can be an object of physical study regarding heat and related subjects, while the traditional houses of Limas and Baghi House can be a media for learning science about force, mass, load and modulus of elasticity. Those media should be involved in physics class as the real objects of learning physics. Thus, scientific literacy media can be an effort to improve student literacy in Indonesia to upgrade Indonesian PISA rankings.

<sup>1</sup>

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