Integration of Physics Concepts in Javanese Culture

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Abstract. The purpose of this article is to find out the integration of physics concepts in Javanese culture. Physics is very closely related to daily life. In the daily life of Javanese culture there are many concepts related to physics. The environment of traditional Javanese society always believes in ancestral messages and customs about how to behave and apply to nature. Various problem solving continues to be associated with science and technology for the growth, development and welfare of human life. In this universe, everything can be explained with the help of science, especially physics. One distinctive feature of Javanese culture's local wisdom is batik making which applies the concept of capillary physics.

1. Introduction

The diversity of religions, ethnicities, cultures, races and languages in Indonesia is no doubt. It is not only its natural potential, this diversity makes Indonesia unique in other countries. Spanning from Sabang to Merauke, Indonesia is inhabited by people who have a variety of cultures or local wisdom. The culture or local wisdom of each different region gives rise to different characters and behaviors. But that diversity makes Indonesia rich in culture.

The nature of culture is a manifestation of the personality of a society that provides an understanding that people's identity is reflected in an orientation that shows their outlook on life and its value system in the perception of seeing and responding to the outside world, in patterns and attitudes of life embodied in behavior everyday, and lifestyle that colors his life [1]. Culture is not only the potential that is directly related to art and culture, but it is all about the way of life of the local community that is related to beliefs, productivity, work, staple foods, creativity, values and norms [2]. Culture emerged and developed in the past, which is continuously used as a handle of life. Although local value, but the value contained therein is considered universal [3].

2. Method

This research is a qualitative descriptive study. The main data source of this research is the variety of traditional Javanese products that contain physics concepts. Secondary sources come from books, journals, and other virtual sources as literature studies. The research data type is text in the form of words, phrases, clauses, sentences or narratives. The purpose of this study was to determine the integration of physics concepts in Javanese culture.

3. Results and Discussion

Culture cannot be separated from the development of science / science. Science and technology are built on the values, habits, norms, beliefs of society and culture. In the traditional community
environment the original knowledge is developed in the form of messages, customs and beliefs that are believed by the community, and delivered from generation to generation how to behave towards nature [4].

Original science as ethnoscience, which is explained as the study of knowledge systems developed from the perspective of local culture regarding the classification of objects, objects and activities related to natural phenomena. Original science also has processes of observation, classification, and problem solving by including all aspects of native culture. Ethnoscience that lives and develops in society is still in the form of concrete experiential knowledge as a result of interactions between the natural environment and its culture [5].

3.1 Science in Javanese Culture
Javanese culture can be interpreted as something that will affect the level of knowledge found in the minds of Javanese people, so that in everyday life the culture is abstract [6] The life of Javanese people holds many interesting peculiarities. Starting from traditions, symbols, languages, cultural systems, social systems, arts, crafts, food and so on. Speech and soft language are characteristic of Javanese people in general. For example the phrase "kulonuwun" that we often hear from Javanese people is a greeting / greeting someone to ride / excuse me to enter the house, to an area, or to other people's forums. This is one proof that Javanese culture teaches the values of politeness and politeness in everyday life.

Javanese people are also very concerned about their relationship with fellow humans, the environment and nature for the creation of a harmonious and harmonious life. This relationship creates a scientific mindset and scientific behavior in Javanese society.

The weakness of the system communicates scientific thought patterns and behavior, causing Javanese science to shift to the form of belief [7]. Javanese people are very identical with beliefs that are often associated with the outside world (supernatural). Though many products contained in Javanese culture that can be explained and proven scientifically, especially by physics. For example, the Javanese community has a calendar calculation system by determining the date change based on the circulation of the month known as the Javanese calendar. This proves that Javanese people have known science long ago. However, the low education system of the ancient Javanese made everyone unaware of science that had not been realized and carried out.

Not only observing the movements of the moon, Javanese also have observed the climate, plants and animals. Most Javanese people live from the agricultural sector. Javanese farmers believe that nature granted by the Almighty to humans must be loved so that nature also gives goodness to human life for harmony and prosperity. Javanese farmers once considered the balance of nature and were familiar with nature.

Therefore, Javanese people always preserve culture by giving knowledge or passing it on to generations so that it does not become extinct. But in this modern era, culture is actually considered an ancient thing, so the old traditions which are considered as a belief will gradually fade.

Currently there has been a lot of research that examines issues around culture and relates it to science. Not only Javanese culture, other ethnic groups in Indonesia each have a culture that can be explained with science.

3.2 Physics Concepts in Javanese Culture
The variety of products produced by Javanese culture ranging from special food, creativity, tools and others become the uniqueness of the Javanese themselves. But not a few of these products contain physics concepts that we very often encounter in everyday life.

3.2.1 Heirlooms and Tools.
Keris is a traditional Javanese heirloom that has a distinctive twisty shape. Its function is almost the same as a knife, but a dagger is usually used as a sign of respect, especially for a kingdom. The basic materials used in making the kris are three types of metals, namely low carbon steel metal, nickel
metal, and tool steel. In the manufacturing process, the dagger experiences a heating stage so that it is easily formed. In this process heat must reach a certain temperature that can be studied in physical matter, namely heat.

Heirlooms are coins (coins) which were used as instruments of economic transactions in ancient times. Many found coins with Javanese letters combined with Arabic script because in ancient times many people from the Netherlands who lived in the land of Java traded their spices using these coins. The advantage of this coin is certainly no doubt when compared to paper money. One of them is waterproof and fire resistant. Metal coins will not be damaged if submerged in water or burned by fire if the coin holder is a bit careless. Coins are hard to damage if they burn because apparently the metal is solid and hard, so the metal does not melt, but will expand. This product also has a physics concept, namely heat.

Javanese people also have cooking utensils made of wood called irus. Irus is a traditional Javanese tool used to stir dishes in the form of rice or vegetables. Irus has a shape like a spoonful or vegetable spoon. The concept of physics contained in irus is that irus is a poor conductor material. The value of heat conductivity of the irus is quite low compared to metals and is approximately the same as insulation materials.

The slow heat transmission speed is what makes it more safe to use household appliances made of wood. While rice scoops made from stanlish, aluminum, iron, and other metals are electrical conductors and good conductors of heat will be less comfortable if used for daily cooking.

If viewed apart from physics, the other benefits of wood irons are compared to the metal spoon, the irus will be more secure in terms of health because there is no hazardous chemical content in the raw material or the manufacturing process. Traditional kitchen equipment is also considered more environmentally friendly. If it breaks, for example, cracks or breaks, it will easily decompose back into the ground so it doesn't pollute the environment.

3.2.2 Traditional Building Forms.

Javanese traditional house known as Joglo house is one of the traditional houses with tropical characteristics as an effort to adapt to the condition of a tropical climate. One form of adjustment to these conditions is to make a broad front porch and a wide hanging roof and expand to all angles to protect it from the sun's heat. This traditional house has a distinctive division of space that consists of a pendopo, pringitan, dalem, krobongan, gandhok and pawon.

The most prominent characteristic of this traditional house is the wood used as the main building material. Besides displaying a classic and elegant impression, wood also has a long enough durability to stand firm. Wood is a natural insulator and is very effective in isolating cold and heat. This means that wooden houses can save energy in significant amounts compared to brick or concrete houses. Another plus is that the thinner and more sturdy wood design, and the presence of pores between the woods, makes the air circulation of wood-based houses better than ordinary houses and gives the impression of coolness to the inhabitants.

In the window, it is also made of wood that is made hollow or latticed so that air and light still enter the room even though the window is closed. This type of window is more resistant to expansion and shrinkage due to temperature changes.

For the kitchen room, Javanese people call it a pawon. Pawon is a cooking kitchen that uses a stove as a wood burning as a fuel and produces ash (awu) throughout the day. In the past, the existence of pawon was identical to dirty areas and symbolized one of gender, namely women. By Javanese architecture in the past, wasps are usually located behind the house, even though it is not uncommon for the pawon to separate from the main building of the house. Pawon is also a place to warm the body, a place of traditional rituals and a place to gather or socialize. Pawons can be an important social area when the homeowner has a hajetan or selametan, then the family or neighbors will gather to cook or rewang.

In addition to making food, neighbors or residents gather at the wasp aims to warm themselves. If the air outside the home is low and the activity of the wasps is high, the air from the wasps will spread
to another room. Pawons play a role in raising the temperature of buildings. Therefore, if we visit the homes of residents during the hours when the owner of the house is on a parade activity such as in the morning/afternoon, we will feel the heat up to the living room. The heat will be stored and last for up to several hours in the house if the use of the wasps is long enough or if the wasp oven furnace still leaves a burning ember still burning after use.

3.2.3 Foods
Klepon is one type of half wet traditional food products and one type of market snacks that have been known and circulated for a long time in the community, especially people on the island of Java. Klepon cake itself is made of glutinous rice flour shaped like small balls inside filled with crushed Javanese sugar. The way to cook it is by boiling it using boiling water and serving it together with grated coconut.

The unique thing about the process of making klepon cake is that when the klepon dough balls are dipped into a pan filled with water, the klepon balls will sink. But when it’s cooked the klepon balls will rise slowly to float and then float on the surface of the pan water. The concept of physics that appears here is the lift force of Archimedes’ law on an object immersed in a liquid (fluid).

3.2.4 Javanese Handicraft
Various Javanese handicrafts that are the product of Javanese creativity. One of them is batik. The stated that initially, written batik was only done by the princesses of the palace as fillers of free time, then spread also to courtiers or people who were close to the royal family. But now batik can be done by anyone [8].

In the modern era as it is today, the type of batik is not only written batik, but there are printed batik and batik screen printing / printing. The concept of physics contained in the process of making batik is an example of capillarity in everyday life. Just like ink on paper, waxy liquid which is a batik liquid or "wax" that is heated and inserted into the canting and then inscribed on the fabric will absorb into the fabric surface.

4. Conclusion
Based on this study, it can be concluded that the life of Javanese people contains a lot of ethnains and physical concepts that are very close to daily life that already existed from ancient times, but because of the weak knowledge of Javanese society in the past resulted in native Javanese science turned into a belief that was explained naturally not scientifically. Now one by one the products of Javanese society can be explained by science, especially physics.

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