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ETHNOSCIENCE STUDY OF *BEDDHA' TEMMO* TYPICAL OF SUMENEP AS A NATURAL SCIENCE LEARNING RESOURCE

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Abstract

This research aims to reconstruct the original science of the Kepanjin community in Sumenep City regarding the process of making beddha'temmo into scientific science, as well as explaining science material related to the reconstruction of original science in the process of making beddha'temmo. This research uses qualitative research with an ethnoscience approach. Data was collected through observation, interviews, documentation, and literature study. The research data obtained was then analyzed in several stages: reducing the data, presenting the data, and drawing conclusions/verification. Based on the results of scientific studies, the integration of beddha' temmo as one of Sumenep's local wisdom is related to junior high school science learning materials so that it can be used as a learning resource for students.

Keywords*: Ethnoscience, Beddha' temmo, Local Wisdom, Science Learning*

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INTRODUCTION

Science learning can be developed by relying on the uniqueness and advantages of a region, such as culture based on local wisdom (Pamungkas et al., 2017). According to Wibowo & Gunawan (Setyowati, 2018), local wisdom is appropriate for strengthening students' character values, which simultaneously impacts learning at school. This is due to a need for more knowledge regarding local wisdom related to science learning in schools. However, science learning in schools still needs to pay more attention to local wisdom instilled in local communities. Teachers' abilities still need to be optimal in connecting concepts, processes, and connections to help students understand natural phenomena in everyday life (Mulyani & Julianto, 2018). According to Hidayati et al. (2021), with local wisdom-based education, the various potentials a region possesses can develop rapidly, and students can get to know the culture and values contained in their region. One example of local wisdom is the *beddha' temmo* typical of Sumenep. It is called *Beddha' Temmo* because this powder is made from temu giring (usually called temmo in Madurese), which local residents use as a cooling powder. *Beddha' Temmo* is a type of local wisdom from Sumenep that can be used as a learning resource in the science learning process. Mukti et al. (2022) stated that a good learning process can be achieved by considering students' cultural backgrounds. Learning that integrates culture into the learning experience process is called ethnoscience.

Ethnoscience is an activity that transforms indigenous science and scientific science (Khoiri & Sunarno, 2018; Rahayu, 2015; Sarini & Selamet, 2019). This knowledge comes from noble cultural values passed down from generation to generation (Muliadi et al., 2022). According to Mardianti et al. (2020), people's original knowledge can come from parents, relatives, neighbors, or the community. Scientific knowledge is obtained from subject matter obtained at school. Learning integrating ethnoscience attracts more students' attention and curiosity (Kantina et al., 2022). Based on the description above, this research aims to examine and reconstruct the original knowledge of the community in making *beddha' temmo* with scientific knowledge. This research also aims to explain scientific material related to reconstructing community knowledge about making *beddha' temmo.*

RESEARCH METHODS

This research is qualitative research with an ethnoscience approach, namely a study of the knowledge system of community culture and local wisdom regarding phenomena and events related to nature. The resource person for this research is the Kepanjin community, which produces beddha' temmo. Data collection includes primary data collected through observation and interview techniques, while secondary data uses literature study. The instrument that will be used in this research is an interview guide. Data analysis in this

research involves data reduction, presentation, conclusion, and verification. The data was analyzed descriptively and qualitatively to reconstruct the community's original knowledge into scientific knowledge.

RESEARCH RESULTS AND DISCUSSION

Based on research conducted through observations and interviews, information was obtained that the making of *bedda' temmo* has been passed down from generation to generation. Usually, *bedda' temmo* is produced for sale in shops and for personal use. *Beddha' temmo* is believed to protect the skin from sun exposure. According to Maulida & Supartono. (2016). *Curcuma heyneana*, known as "temu giring", has a high antioxidant content as a sunscreen. Besides that, beddha' temmo is also used as a body scrub for brides to brighten and smooth their skin.

The ingredients used in making *bedda' temmo* use natural ingredients, namely temu giring, which is ground and mixed with rice flour and aromatic ingredients, namely pandan and jasmine flowers. To make the dough, the mixture of ingredients is added to water that has been boiled with roses to make the *bedda'* smell more fragrant. The mixed dough is formed into small balls using both hands and placed on a tray. Then, the dough is dried in the sun. *Bedda' temmo* that has been dried in the sun has a dry texture and is not soft. To use it, add a little water to a small container containing 4-5 *Beddha' Temmo* grains, then apply and rub gently on the body.

Figure 1. *Beddha' Temmo*

The results of observations and interviews that have been carried out with resource persons can transfer indigenous knowledge into scientific knowledge. The research data was then reconstructed into scientific knowledge, the results of which are presented in Table 1.

Table 1. Reconstructing Original Community Knowledge into Scientific Knowledge

Question/topic	Indigenous Science/ Traditional knowledge	*Science knowledge*
1. What is temu giring?	One of the spices used in the bedda' temmo mixture	Temu giring is a spice reproducing by natural vegetative means, namely living roots or rhizomes. The rhizome is a modified stem located in the ground, branches, and grows horizontally from the sides. (Riastuti et al., 2020).
2. What is rice flour?	Flour that comes from refined rice	Rice flour is an example of a physical change. (Wibowo, 2013) defines *physical change* as a change in matter that does not involve the creation of new material; The original substance remains unchanged, only the shape, form and size change. Refined rice only changes

			shape and size, but the molecular properties of the substances in the rice and flour remain the same.
3.	What is the process of mixing the ingredients in making *beddha' temmo*?	Rice flour is mixed with ground ginger (1:2) then added with rose water/boiled rose water.	The mixing of ingredients in *beddha' temmo* is a heterogeneous mixture. A heterogeneous mixture is a mixture whose parts are not the same in color or taste, the ratio of the substances mixed, or the ratio of one component to another is not the same (Wandini et al., 2022).
4.	How do you boil rose water to be used as a diluent for *beddha*'?	Water is mixed with rose flowers (1:5) then boiled as usual until it boils and cooled	In the boiling process, heat transfer occurs. Heat transfer is the transfer of heat energy due to temperature differences (Pandiangan et al., 2018). Heat transfer occurs by convection. So, in boiling water, heat transfer occurs sequentially, from conduction to convection.
5.	Why use pandan as the aroma of *beddha' temmo*?	So that the powder smells good	Pandan is one of the additives or natural additives used to provide aroma to beddha'. According to (Rachmawati, 2020)
6.	Why is the powder mixture diluted using rose water?	So that the powder mixture becomes even when mixed	Water acts as a solvent because water is generally suitable for various compounds (Prana, 2015). Adding water speeds up the production process, allowing the powder ingredients to mix more quickly and efficiently.
7.	How do you shape the *bedda' temmo* so that it becomes a small circle?	Take the dough that is already flat, then put it in your hand about 5 marbles in size and then twist it into a circle.	The formation of *bedda'* dough into small balls is a physical change. Physical changes are changes that involve changes in form, do not produce new substances, and can return to their original shape/form (Muchson et al., 2016)
8.	Why is *beddha'temmo* dried in the heat of the sun, not using a heating device?	So that the resulting powder is excellent and dry optimally, it is best to use sunlight; using a heating device is not necessarily as good as using sunlight.	The sun's heat reaching the earth is an example of a natural form of radiation heat transfer. Even though the distance between the sun and the earth is very far and separated by a vacuum, the sun's heat can still reach the earth through radiation (Wahyono & Rochani, 2019).
9.	What effect does weather have on the drying process?	There is. In hot weather, the powder produced is good and dry to the maximum, whereas in drying in cold weather, the powder produced is not good because it does not get sunlight.	Weather is the condition of the air at a particular place and time. These conditions can include daily wind, temperature, rainfall, and solar radiation throughout the earth's surface. Weather conditions can change quickly (Syar & Meriza, 2020). This affects the drying of the beddha' tempo. There is. In hot weather, the powder produced is good and dry to the maximum, whereas in drying in cold weather, the powder produced is not good because it does not get sunlight.

10. Why does *beddha'temmo*, which initially has a soft texture, become hard after drying?	Because it has undergone a drying process by the sun, the powder which was initially soft becomes hard	The drying process is carried out to reduce water content, stop enzymatic reactions, and prevent reduced quality and damage to simplicia. The purpose of drying is to ensure that the sample is not easily damaged and can be stored for extended periods. (Ariani et al., 2022).
11. Are there any chemicals added to making bedda' temmo?	There isn't any. All ingredients used are natural from nature	Making *beddha' temmo* comes from natural ingredients without involving addictive substances. According to (Mardin et al., 2022), natural additives are substances or materials obtained from extracting natural ingredients.
12. Does drying temperature affect the quality of *bedda'*?	Influential. Because high temperatures produce a powder that is dry to the maximum, while low temperatures produce a powder that is less than optimal and the color is less bright, the aroma is more pronounced.	The water content decreased more rapidly with increasing drying temperature. The higher the drying temperature, the faster the heat transfer and water evaporation from the food (Subagya et al., 2018).
13. Is a damaged beddha'temmo marked by the presence of fungus?	Yes, damaged beddha' temmo can grow fungus	The presence of microorganisms growing in a food has a significant impact on reducing the quality of the product. This can cause contamination of the material (Sulastina, 2020).
14. If so, how can mold grow on powder?	Because humid air and storage areas that are not exposed to the sun cause mold to grow on the powder.	Humidity is the factor that most influences the growth of mold. In general, mold grows best in moist air. This is closely related to the fungus' need for moisture in the form of water or steam (Budiman et al., 2014).
15. Why do you have to dilute it with water first when using *bedda' temmo*?	To make it more even and more manageable when using powder on the body. If you directly use beddha' in a round shape, it will be difficult to apply to the body.	The powder, initially in the form of liquid, becomes liquid because it is melted using water. This includes suspension. According to Wahyuni & Yunalti (2017), suspension is a liquid preparation containing insoluble solid particles dispersed in the liquid phase.

Bedda' temmo is one of the local wisdom of the people in Kepanjin, which can be used as a learning resource for junior high school science by transferring the community's original knowledge into scientific knowledge. This will make it easier for teachers to connect science concepts with making *bedda' temmo*. By linking essential competencies and existing components in the process of making beddha' temmo, it becomes a source of learning for students. The relationship between the concept of science and bedda' temmo, which is linked to the basic competencies of science subjects at the junior high school level, is presented in table 2.

Tabel 2. The relationship between making *bedda' temmo* and basic science competencies in junior high school

No	Kompetensi Dasar	Konsep IPA dalam beddha' temmo
1	3.2 Compare how plants and animals reproduce.	Explains the natural vegetative reproduction of plants, namely living roots or rhizomes.
2	3.3 Explain the concept of mixtures and single substances (elements and compounds), physical and chemical	Making rice flour from ground rice and making bedda' temmo into spheres is a physical change because it does not produce

	properties, physical and chemical changes in everyday life	new substances. The substances and molecules in the flour are the same as rice, only the shape changes from dense to smoother.
3	3.4 Analyze the concepts of temperature, expansion, heat, and heat transfer, and their application in everyday life, including mechanisms for maintaining stable body temperature in humans and animals	Drying using sunlight is carried out to reduce the water content in the bedda' temmo, including heat transfer by radiation.
4	3.5 Group fungi based on characteristics, reproductive methods, and relate their role in life.	Mold needs a moist environment to grow. When bedda' is stored in moist conditions, mold has a greater chance of growing.
5	3.6 Explain various additives in food and drinks, addictive substances, and their impact on health	The ingredients used in Beddha' Temmo use natural ingredients without any chemicals.

CONCLUSIONS AND SUGGESTION

A. Conclusions

From the results of the research that has been carried out, it can be concluded that the original knowledge of the Kepanjin people in making bedda' temmo can be reconstructed into scientific knowledge obtained from generation to generation. This can be used as a learning resource for several essential competencies, namely basic competencies 3.4 and 3.6 in science learning. Students can recognize and learn local wisdom in the surrounding environment by linking local wisdom with science learning.

B. Suggestion

This research is limited to a literature review regarding bedda' temmo, so there is a need for further empirical research that applies science learning with an ethnoscience approach based on local wisdom bedda' temmo, which adapts the application to ethnoscience approaches in other regions.

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