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Review Article

Etnotechnology of *Paocik Santan*: A Local Malay Innovation in Coconut Milk Processing

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ABSTRACT

Paocik santan is a traditional coconut milk press that can still be found in Penyasawan village. This study aims to analyze and reconstruct the indigenous science of the Paocik santan into scientific knowledge. Data analysis was conducted using the Miles-Huberman model, which includes data reduction, data display, conclusion drawing, and verification. The results of the study indicate that the Paocik santan is a tool that benefits the community by simplifying work; the effort applied to the paocik is minimized as the energy input is also small, thus shortening the required time. The local wisdom of the Paocik santan in Penyasawan village has the potential to serve as a learning resource in physics for the topics of Work and Energy.

Paocik Santan is a traditional tool used for extracting coconut milk, still found in the village of Penyasawan. This study aims to analyze and reconstruct the indigenous knowledge surrounding Paocik Santan into scientific knowledge. Data analysis was performed using the Miles-Huberman model, which includes data reduction, data presentation, conclusion drawing, and verification. The findings indicate that Paocik Santan is a tool that offers significant benefits to the community by simplifying the coconut milk extraction process. The effort required to operate the Paocik is minimal, with a corresponding reduction in energy consumption and time required for the task. The local wisdom associated with Paocik Santan in Penyasawan has the potential to serve as a valuable learning resource for physics education, specifically in the topics of energy and work.

Keywords:
physics learning, coconut milk paocik, local wisdom, ethnoscience

INTRODUCTION

Indonesia is a nation characterized by a rich diversity of cultures, customs, and traditions that Continue to be preserved by communities with strong ties to their heritage (Prabowo & Sudrajat, 2021). Each of Indonesia's diverse ethnic cultures possesses its own distinct local wisdom. In the Current era of globalization, efforts have emerged to revitalize, empower, preserve, and develop the Customs and the role of traditional institutions (Brata, 2016). The use of local cultural values to Address contemporary challenges is a tangible manifestation of this cultural revitalization. Furthermore, local wisdom can not only address future challenges but also serve as a unifying Element that reinforces national identity. This local wisdom is reflected in the long-standing daily

Local wisdom holds significant importance in maintaining the sustainability of a culture in a particular place, while also ensuring its continued preservation. The values contained within local wisdom represent a distinctive conception—ingrained and inherent to an individual or community—that influences the available choices of form, method, and purpose of actions. These values are passed

down through continuous ritual or educational activities. Examples can be found in the form of songs, proverbs, maxims, teachings, and mottos that are integral to ceremonies such as weddings, funerals, and childbirths. For instance, in a 2017 study by Widyaningrum titled "Javanese Traditional Traditions in Welcoming the Birth of a Baby (A Study on the Implementation of the Jagongan Tradition at a Baby's Sepasaran) in Harapan Jaya Village, Pangkalan Kuras District, Pelalawan Regency," she found that the jagongan bayi tradition is highly compatible with and a distinctive characteristic of rural Javanese society, which prioritizes a sense of kinship and empathy. The benefits of practicing jagongan bayi include: the new mother feels comforted as the home becomes more lively; she can gather with relatives; and assistance is provided with baby equipment and supplies, which in turn strengthens the bonds among villagers.

Ethnoscience is the process of transforming indigenous science (knowledge developed within a community) into scientific knowledge (Rahayu & Sudarmin, 2015). Scientific knowledge consists of concepts, principles, theories, or laws that are reproducible and have been recognized by the scientific community (Ilhami, Syahvira, Maisarah, & Diniya, 2020). Ethnoscience-based learning is proposed for educational implementation because it aligns with the learning process stipulated in the 2013 Curriculum, which includes observing, questioning, gathering information, experimenting, and communicating.

One promising aspect to be studied as content for science learning through an ethnoscience approach is culture (Novitasari, Agustina, Sukesti, Nazri, & Handhika, 2017). This aligns with the nature of culture as a social heritage that is acquired by community members through learning (Purwadi, 2005). Culture is a reflection of community life, often manifesting as knowledge derived from trial and error (Har, 2013). Consequently, there is a close relationship between culture as a reflection of community life and the indigenous science of that society.

Ethnoscience-based learning expects students to conduct direct investigations into a culture, including observation, interviews, and even literature analysis regarding the indigenous culture of the surrounding community (Indrawati & Qosyim, 2017). Furthermore, the application of ethnoscience learning not only aligns with contemporary developments and the principles of the educational curriculum currently adopted in Indonesia but also aims to instill a sense of love for one's culture and nation, enhancing students' knowledge and understanding of the culture and potential of their local region.

Riau Province is one of the provinces bordering West Sumatra, North Sumatra, and Jambi Provinces. Riau has several regencies, one of which is Kampar Regency. The Kampar community is known for adhering to a customary system characterized by strong kinship ties (Omar, 2015). The Kampar people leverage togetherness in carrying out large activities to ensure work is completed quickly. This is also true for the community in Penyasawan. During major events such as bagholek (feasts) and thanksgiving celebrations, the community, especially the housewives, engages in large-scale cooking in one place. Various dishes are served to entertain guests. Behind this, however, are several traditional tools used by the community to assist in their work, one of which is the Paocik santan.

The Paocik santan is a traditional coconut milk press that can still be found in the village of Penyasawan. Not many people own this tool anymore, as many have switched to modern, electric coconut milk machines. However, in some areas, this tool is still used for large-scale activities. Besides saving electricity and costs, using this tool fosters a sense of kinship, and the quality of the extracted coconut milk is considered much better. Based on this background, this research aims to analyze and reconstruct the indigenous science of the Paocik santan into scientific knowledge.

METHODS

The research method used is a case study approach. A case study is an in-depth investigation of a unique or distinct phenomenon within a specific group, institution, or individual (Hidayat & Purwokerto, 2019). The purpose of a research case study is to examine research questions and problems within their real-life context, from which they are inseparable.

This research was conducted through direct observation in Pontianak Hamlet (Dusun Pontianak), Penyasawan Village, Kampar District, Kampar Regency. This location was chosen because some community members in Penyasawan village still use the Paocik santan as a household tool for cooking.

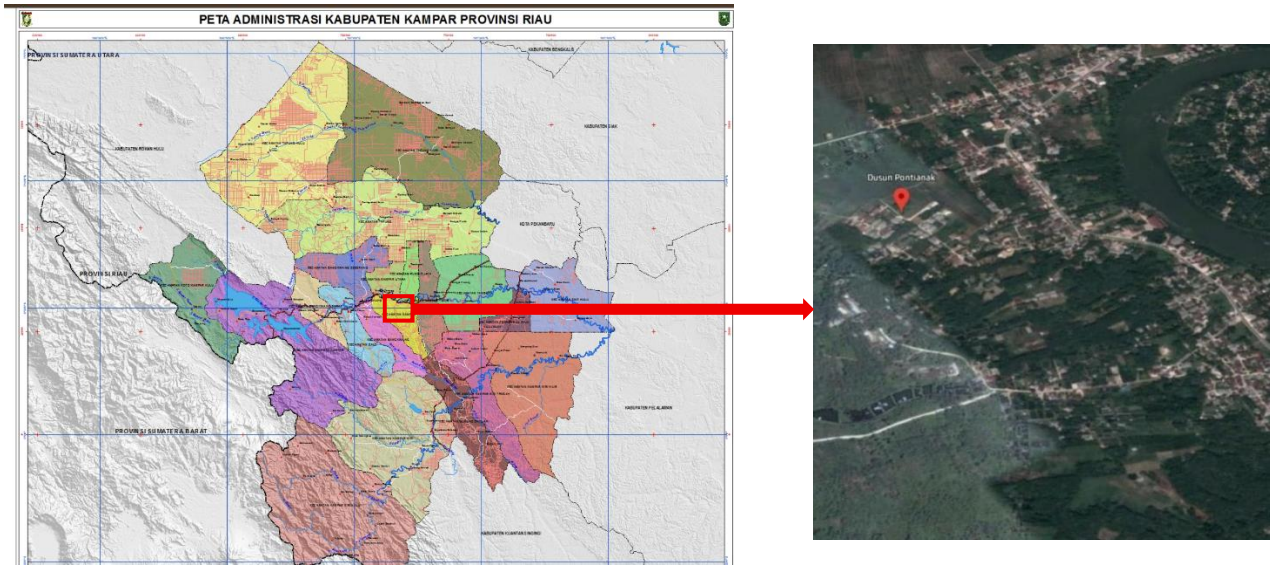


Figure 1. Map of Penyasawan Village, Kampar Regency, Riau
(Source: www.kamparkab.go.id)

Furthermore, an interview technique was also employed to obtain information about the Paocik santan tool itself. The respondent selected as the informant was a housewife named Mrs. Dewiana. She is a resident of Penyasawan who still uses the Paocik santan for cooking activities in the area.

The reconstruction process focused on the origin, function, advantages, and disadvantages of the tool, a comparison with modern equivalents, and its characteristics in terms of materials, construction, and mechanism of action. These aspects were then used to establish connections with scientific concepts. Data analysis was conducted using the Miles-Huberman model, which includes data reduction, data display, conclusion drawing, and verification.

RESULTS AND DISCUSSION

Paocik santan is a traditional tool used by the Kampar community, particularly in the village of Penyasawan, to extract coconut milk. Although the exact origin of this tool is unknown, its usage has long been embedded in the daily lives of the local people, especially in assisting household tasks during large-scale food preparations.

"*As for the history, I don't really know, but Paocik Santan has existed since I was born. And this tool was often used by the uwang tuo (elders) here. Maybe at that time, I was still a child, in the 1980s. But it's possible that this tool has existed since the Dutch colonial era. As far as I know, this tool also exists in West Sumatra*." (Dewiana, 2022)

From the above statement, the respondent speculates that the tool has existed since the Dutch colonial period. Geographical factors also make it possible for this tool to be found in West Sumatra. The Penyasawan community uses paocik santan for large quantities of coconut. Usually, an electric grater is used, and the grated coconut is then squeezed in a container called kawong boye. This tool is used during large-scale cooking activities to prepare curry or various other coconut milk-based dishes. With the presence of this tool, work becomes easier because the technique of using this tool helps simplify the tasks of the local people.

"*There are two ways of squeezing coconut milk here. The first way is the coconut is grated using a pangu, then water is added and it is squeezed by hand, then filtered using a strainer. But pangu is usually used when the amount of coconut needed is small. The second way, when there is a lot of coconut, people here use a grating machine and then put it into kawong boye, add enough water, tie it up, then press it using Paocik Santan. Paocik Santan is only used to extract coconut milk. Usually only for large events, such as bagholek or syukuran. For me, something made by hand has a better taste, also more cost-effective because it uses natural materials and tools, especially when done together—it's joyful, you can gather with relatives at the same time. Try using ready-made tools, sometimes the taste of the coconut*

milk is gone, and it's more expensive too. When using Paocik Santan, it's more economical, saves energy. If there's a lot of coconut, squeezing it by hand is tiring, right? With Paocik Santan, you just need to sit on top of the kayu panyopik. It does make it easier, but sometimes it's tiring too to lift it up because it's heavy—depending on the user. Yes, because the tool is heavy, if you want to move it somewhere, it's difficult, it needs to be lifted by 2 to 3 people." (Dewiana, 2022)

Paocik Santan consists of four parts: kayu tegak Paocik Santan, ocik, kayu panyopik, and iliu santan. Paocik Santan itself is made from jackfruit tree and coconut tree. So, the bottom part is called ocik, made from jackfruit wood, while kayu panyopik is made from coconut wood. Yes, because the ocik must be made from heavy wood, so that when we sit on it, it doesn't slide everywhere. Coconut wood is quite light, so it's easier to lift." (Dewiana, 2022)

The structure of the tool is designed simply as shown in Figure 2. The grated coconut will be placed between the two wooden parts, which are pressed by sitting on the end of the wood. The coconut milk will come out through a small hole called tompek iliu santan, as shown in Figure 2.

Figure 2. ***Paocik santan***

Figure 3. ***Paocik santan***

The working mechanism of this tool is exactly like a simple machine of second-class lever, such as a nutcracker.

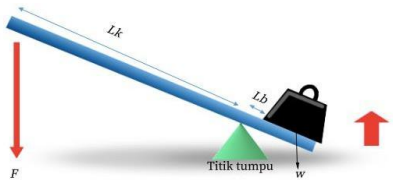
"So, here's how it works. First, the grated coconut is placed into the kawong boye and then water is added. The kawong boye is tied and placed on top of the ocik, then pressed with the kayu panyopik. Press the panyopik by sitting at the end of the paocik until the liquid comes out and flows into the tompek iliu santan. Don't forget to put a basin underneath. Just wait until the coconut milk stops coming out. Usually, we sit at the end so that more liquid is extracted and the pulp becomes dry." (Dewiana, 2022),

The design of the paocik santan is made tall (with supporting legs) so that it does not touch the floor and makes it easier for the user to sit on the tool. The iliu santan is perforated in the middle as a passage for the coconut milk to flow. The vertical position of the paocik santan is made slightly tilted so that the coconut milk can easily flow into the iliu santan.

From the explanation of Paocik santan, it can be seen that the local community's knowledge contains elements of local wisdom, and this indigenous knowledge can be reconstructed into scientific knowledge, as shown in Table 1.

Table 1. Reconstruction of Indigenous Science into Scientific Science

Indigeneous knowledge	Scientific knowledge
The availability of Paocik Santan for large-scale use helps ease the workload of the community without requiring much physical effort, especially when done together.	This indicates that Paocik Santan benefits humans by simplifying tasks. Less effort is needed as it requires less energy and time to operate.
Respondents believe that food processed using tools made from natural materials tastes better than those made from stainless steel or metal.	Cooking utensils made from natural materials such as wood do not release compounds or react with acidic foods, unlike stainless steel tools which require special handling as exposure to hazardous substances may cause rust.

Paocik Santan saves energy and costs, especially when processing a large amount of coconut milk, as it only requires the user to sit on the tool. However, its drawback is its heavy weight, making it hard to lift.	Paocik Santan facilitates household tasks manually without electricity. It requires less energy to produce pure coconut milk than electric tools. According to the electrical energy concept: $E = V \times I \times t.$ Longer operation time increases energy cost. While electric machines are more practical, they do not need relocation like Paocik which must be stored in a dry place to avoid decay and needs 2-3 people to move it due to its weight.
Paocik Santan consists of the 'ocik' (wooden base) made from jackfruit wood, chosen for its strength and stability during use.	Jackfruit wood (Artocarpus heterophyllus) is termite and mold resistant, easy to shape, semi-hard, strong, and sturdy. However, its resinous texture adds to its weight.
The 'panyopik' wood, which presses the base wood, is made from coconut wood, chosen for being lightweight and strong.	Coconut wood is strong and lighter than jackfruit wood, making it suitable for panyopik. However, it is unsuitable as ocik due to high water absorption, making it prone to decay, deformation, and fungal attacks.
To use the tool: water and grated coconut are mixed and placed into 'kawong boye', tied, and placed on the ocik. It is slowly pressed with the panyopik wood. Once securely positioned, the user sits at the end of the panyopik until the coconut milk flows out from the tompek iliu santan.	In operation, Paocik Santan resembles a class II lever (like a nutcracker), where the load (kawong boye) is between the fulcrum and the effort.  A lever is a simple machine consisting of a rigid bar that can rotate around a fulcrum.  In this context, the variables used are: F for effort force (in Newtons), w for load (in Newtons), L_e for effort arm (in meters), and L_l for load arm (in meters). The principle behind how a lever works is that a small amount of force can be used to move a heavy load. This can be achieved by shortening the load arm, which in turn lengthens the effort arm. The longer the effort arm, the less force is required. Mathematically, the relationship between these variables is expressed with the formula:

	$F \times Lk = w \times Lb$ $F = \frac{w \times Lb}{Lk}$

Based on the explanation above, it can be concluded that *Paocik Santan* possesses scientific value that can be connected to learning processes. The reconstruction of community-based knowledge into scientific knowledge provides scientific meaning to the functions of the tool. Therefore, scientific knowledge can serve as a learning resource, particularly in science and physics education. Students are expected to reconstruct the knowledge they acquire from their surrounding environment into scientific understanding, making classroom learning more meaningful. From Table 2, the reconstruction results show that traditional technology has been successfully interpreted within the framework of scientific knowledge.

Table 2. Potential of Local Wisdom in Physics Learning

Description of Local Wisdom Potential in Physics Learning	Interconnectedness in Physics Learning	
	Physics	Materials
Paocik Santan is a traditional tool used to squeeze coconut to produce coconut milk. It is made from jackfruit tree and coconut tree wood. It consists of three main parts: ocik (the base where kawong boye is placed), panyopik wood (used to press the kawong boye), and tompek iliu santan (the outlet for the extracted coconut milk). Kawong boye is the container for the coconut and water mixture. The working principle is that the mixture is placed on the ocik, then pressed by the panyopik. The user applies pressure downward until coconut milk flows out. The potential uses of Paocik Santan in physics learning include: 1. Utilizing traditional tools as part of preserving Kampar cultural heritage 2. Identifying the relationship between energy and work using the Paocik Santan 3. Analyzing the working principle of Paocik Santan as an application of simple machines	3.5 Explain the relationship between energy and work 3.6 Demonstrate the application of power in daily life 4.1 Demonstrate the use of simple machines commonly found in everyday life 4.2 Solve simple quantitative problems related to simple machines	1. Work and Energy 2. Simple Machines

Physics education is highly relevant to local wisdom about traditional technology. Therefore, utilizing local wisdom such as Paocik santan in physics education can help students understand scientific concepts through contextual issues related to their live.

CONCLUSION

Paocik santan is a traditional tool of the Kampar community that is commonly used to squeeze grated coconut to produce coconut milk. This tool is usually employed during large-scale events to prepare curry or various other coconut milk-based dishes. Typically, a large portion of coconut milk is used to be processed into delicious meals. However, with the presence of this tool, by applying the concept of a simple machine—specifically a lever—household tasks can be completed more easily. This local wisdom holds potential to be utilized as a learning resource in physics education.

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