HOMBO BATU A TRADITIONAL ART THAT CAN BE EXPLAINED WITH THE LAWS OF PHYSICS

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Abstract

This study aims to explain *Hombo Batu*, a traditional art from South Nias, using a physics approach to understand the physical principles involved in the game. The objective of this research is to identify physical concepts such as force, kinetic energy, and elasticity that influence the movement of the stones in the game. The method used is a literature review, in which the author examines relevant literature on *Hombo Batu*, basic physics, and theories related to the application of physics laws in traditional arts. The findings of the study show that *Hombo Batu* involves physical principles such as impact force, stone rebound, and energy transfer between the stones used. This research demonstrates that through an understanding of physics, the phenomena in *Hombo Batu* can be scientifically explained, offering a new perspective in connecting traditional culture with scientific knowledge.
Keywords: *Hombo Batu, Traditional Art, Physics Laws, Force*.

Abstrak

Penelitian ini bertujuan untuk menjelaskan *Hombo Batu*, seni tradisional dari Nias Selatan, dengan menggunakan pendekatan hukum fisika untuk memahami prinsip-prinsip fisika yang terlibat dalam permainan tersebut. Tujuan penelitian adalah untuk mengidentifikasi konsep-konsep fisika seperti gaya, energi kinetik, dan elastisitas yang memengaruhi gerakan batu dalam permainan. Metode yang digunakan adalah studi pustaka, di mana penulis mengkaji literatur terkait *Hombo Batu*, fisika dasar, serta teori-teori yang relevan dengan penerapan hukum fisika dalam seni tradisional. Hasil penelitian menunjukkan bahwa *Hombo Batu* melibatkan prinsip-prinsip fisika seperti gaya benturan, pemantulan batu, serta transfer energi antara batu yang digunakan. Penelitian ini memperlihatkan bahwa melalui pemahaman fisika, fenomena dalam *Hombo Batu* dapat dijelaskan secara ilmiah, memberikan perspektif baru dalam menghubungkan budaya tradisional dengan ilmu pengetahuan.
Kata Kunci: *Hombo Batu; Seni Tradisional; Hukum Fisika; Gaya*

A. Introduction

Hombo Batu is a traditional art form originating from South Nias, which involves the structured and stable arrangement of large stones without the use of adhesives. This art is more than just a cultural aspect, as it also reflects a deep understanding of the physical principles related to balance, force, and mechanics. Therefore, *Hombo Batu* also contributes to education, both in terms of the development of practical skills and scientific understanding (Harefa, D., et al., 2024).

Hombo Batu is one of the traditional arts from South Nias, North Sumatra, known for the vertical or horizontal arrangement of stones in a specific formation. It is often used in various cultural ceremonies, traditional houses, or as a decorative and symbolic element (Harefa, D., et al., 2024). This work holds deep cultural value, reflecting the

social and spiritual harmony of the Nias community. In its construction process, large stones are arranged without the use of adhesives, requiring skill and a deep understanding of balance and stability techniques. Generally, Hombo Batu is not just a form of visual art, but also reflects exceptional skills in understanding the principles of mechanics and physics that underlie the stability and strength of the built structure. Typically, large stones are used as the primary material, and their positioning must be done with great care to avoid any shifts that could collapse the structure. Therefore, this art can be explained from a physics perspective through the application of laws such as equilibrium, friction, and pressure distribution (Harefa, D., 2024).

The art of *Hombo Batu* from South Nias is an integral part of the local community's culture. This tradition has existed since the time of their ancestors and is used in various ceremonial rituals, as a symbol of strength, and as an indicator of social status. This structure is often found in the construction of traditional houses, particularly those that function as supports or as symbols in cultural ceremonies (Harefa, D., 2024). What is fascinating about this art form is its ability to arrange very large stones without using adhesives or other materials, relying solely on the principles of balance and the selection of stones with shapes and sizes that support each other. Although it holds high cultural value, the arrangement of these stones can also be explained scientifically through the principles of physics that underlie their strength and stability (Harefa, D., et al., 2024).

Newton's first law states that an object will remain at rest or move in a straight line with constant velocity if no external force acts upon it. In the context of *Hombo Batu* (Stone Pile), this law applies to a stone placed in a certain position, where it remains stable as long as no external force disturbs its equilibrium. Additionally, Newton's second law, which governs force and acceleration, also plays a role in the distribution of forces on the arranged stones. When large stones are stacked correctly, the forces acting on the system will be balanced, causing the stones to remain in position (Harefa, D., et al., 2024).

Static equilibrium is a state in which the sum of forces and the sum of torques acting on a system are both zero. In the arrangement of *Hombo Batu* (Stone Pile), each stone supports the weight of the stone above it. For the structure to remain stable, these forces must be balanced, and the center of mass of each stone must align with the support point of the stone below it. The gravitational force pulling the stone downward is counterbalanced by the normal force from the lower stone. The study of static equilibrium is crucial for understanding how stones can be arranged in a position that is not easily displaced or collapsed (Murray, R. M., & Saff, E. B., 2014).

Friction is the force that occurs when two surfaces are in contact and attempt to prevent relative motion between them. This frictional force is crucial in ensuring that the stacked stones do not shift or fall. The rougher the surface of the stones, the greater

the frictional force, which helps maintain the stability of the *Hombo Batu* (Stone Pile) structure. The coefficient of friction between the stacked stones plays a key role in ensuring the stability of the arrangement. Rougher stones generate a larger frictional force, preventing the stones from easily sliding. (Serway, R. A., & Jewett, J. W., 2014)

Pressure is the force applied to an area. In the context of arranging *Hombo Batu* (Stone Pile), each stone experiences pressure from the stones above it. This depends on the size and shape of the stones. The pressure exerted on a stone will be distributed over a larger area if the stones have flat surfaces or support each other. This principle is important in preventing damage to the stones at the bottom due to excessive pressure. When the stones are arranged with shapes and sizes that fit together, the pressure is evenly distributed, maintaining the strength and stability of the structure. (Callister, W. D., 2014).

In structural physics, stability is an important concept that refers to a structure's ability to remain in a balanced position even when external forces act upon it. In the arrangement of *Hombo Batu* (Stone Pile), stability heavily depends on the position and shape of the stones, as well as the load distribution that occurs on each stone. A well-designed structure will ensure that large stones remain firm and do not easily shift, even when smaller stones are placed on top of them. (Hibbeler, R. C., 2017).

Education in the context of *Hombo Batu* is not limited to teaching technical skills but also includes scientific, social, and cultural education. This art form teaches the principles of physics underlying stability and balance, as well as teamwork skills and creativity in design. Furthermore, "Hombo Batu" also imparts lessons on the importance of maintaining harmony with nature and preserving cultural heritage. Thus, *Hombo Batu* serves as a holistic educational tool, connecting practical, scientific, and social knowledge in the lives of the people of South Nias.

Education within the context of *Hombo Batu* primarily involves physical and practical skill training. In the process of creating it, the people of South Nias, particularly the younger generation, are taught how to lift, arrange, and stack stones correctly. This includes skills such as: Stone Measurement and Adjustment: Practitioners of this art learn to select and cut stones to the correct size so that they can support and stabilize each other. This teaches skills in measurement and precision. Teamwork Skills: Since the stones used are often large and heavy, the construction of *Hombo Batu* typically involves teamwork. Therefore, this art also teaches the importance of communication, coordination, and collaboration in achieving common goals. Understanding Balance: The community members involved in stacking the stones directly learn the principles of balance. They understand how to place stones so that they remain stable without falling or shifting, which can be related to the concepts of physical and static equilibrium. (Harefa, D., & Fatolosa Hulu, 2024).

The process of building *Hombo Batu* also teaches the importance of the relationship between humans and nature. Before

beginning the construction of the stone structure, the people of South Nias carefully select the stones from nature, paying attention to the quality of the stones and the proper methods of quarrying them. This process imparts values such as: Sustainability The use of stones sourced from nature in a way that does not damage the environment teaches the value of sustainability in utilizing natural resources. Local Wisdom: The knowledge of the characteristics of stones and how to process them is linked to the education of local wisdom passed down through generations. This teaches the importance of preserving cultural heritage and the environment.

Hombo Batu from South Nias is a traditional art form closely linked to meticulous construction techniques, utilizing the principles of physics to create stable and sturdy structures. The principles of physics related to force balance, friction, pressure distribution, and structural analysis play a crucial role in the success of this stone stacking art. The literature review presented provides a solid foundation for understanding how physics explains this traditional art, which not only holds cultural value but also demonstrates an extraordinary understanding of the laws of nature.

B. Research Methodology

The method used in this article is the library research method or literature study, which involves using written sources such as books, articles, journals, and other scientific publications as the primary data to explore knowledge related to the research topic (Harefa, D., et al., 2024). In the research titled *Hombo Batu* Traditional Art Explained by the Laws of Physics," the library research method is employed to analyze and collect relevant information about the traditional art of *Hombo Batu* and the application of physics principles that explain the stability and structure of the stones used in it. Here is a description of the steps and techniques used in the literature research for this topic:

1. **Identifying Relevant Sources**

The first step in literature research is identifying sources relevant to the topic being studied. In this case, the sources sought include:

a. **Literature on the Culture and Traditional Art of Nias**

Books or articles that discuss *Hombo Batu* as part of the culture of South Nias, including its symbolic meaning, history, and the context in which it is used in traditional ceremonies and indigenous architecture.

b. **Relevant Physics Theories**

Sources that discuss the principles of physics relevant to the structure and balance of solid objects, such as laws of equilibrium, friction, pressure distribution, and structural analysis that can be applied to *Hombo Batu.*

c. **Related Research Articles**

Articles that investigate the relationship between traditional art and principles of physics or science, especially those linking traditional architecture or construction with scientific aspects.

These sources provide the foundation for understanding both the cultural and scientific perspectives of *Hombo Batu* and its construction principles.

2. Collection of Written Sources

The collection of bibliographic materials is carried out by accessing various sources that provide information on the two main aspects of the research: traditional *Hombo Batu* art and related physics theories. The collected sources may include:

a. **Books**

Books that discuss the culture of Nias, the history of the *Hombo Batu* art, as well as basic physics books that explain mechanics and equilibrium concepts applied to stone construction.

b. **Scientific Journals**

Scientific articles that explore the relationship between traditional art and physics, or architectural techniques that can be scientifically explained.

c. **Research Reports and Documents**

Reports containing research findings on traditional art and the application of physics principles in local cultures.

d. **Online Sources**

Online articles that discuss *Hombo Batu* Nias culture, and the connection with physics knowledge.

These sources help to gather diverse information on the topic, enabling a deeper understanding of both the cultural significance of *Hombo Batu* and the scientific principles that explain its construction.

3. **Analysis and Classification of Sources**

After gathering various bibliographic sources, the next step is to analyze and classify the information obtained. This analysis will divide the research into two main areas:

a. Cultural and Traditional Area

This analysis covers the study of the origins and philosophy behind *Hombo Batu* as well as how the people of South Nias use it in their social life and traditional ceremonies. Information will be derived from cultural and anthropological literature.

b. Physics and Mechanics Area

This section will examine the physics laws that explain the process of stacking stones in a stable manner without adhesive. This includes laws of equilibrium, frictional forces, pressure distribution, and the mechanical structure that applies to the stones in *Hombo Batu* textbooks and research articles related to mechanics will serve as primary sources for this part. By analyzing and classifying these sources, the research will integrate both cultural understanding and scientific principles to explain the traditional art of *Hombo Batu.*

4. Synthesis and Integration of Information

After analyzing information from various sources, the researcher will then conduct a synthesis to integrate both fields (culture and physics). At this stage, the researcher will connect the knowledge of stone stacking techniques in the art of *Hombo Batu* with relevant physics principles. This synthesis may involve:

a. **Linking Traditional Knowledge with Physics Principles**

For example, how the principle of static equilibrium in physics can explain the technique of stacking stones in a stable manner without the use of adhesives.

b. **Finding Connections Between Culture and Science**

Demonstrating that "Hombo Batu" is not only a cultural aspect but also an example of applying natural laws, such as frictional

forces and pressure distribution, in the everyday life of the people of South Nias.

This synthesis process will help bridge the gap between the cultural and scientific perspectives, highlighting how traditional practices like *Hombo Batu* reflect an inherent understanding of natural principles. The library research method for the topic *Hombo Batu* Traditional Art Explained by the Laws of Physics" aims to explore and examine information from written sources relevant to two main aspects: traditional *Hombo Batu* art and the related physics theories. This research is conducted by identifying, collecting, and analyzing bibliographic sources that discuss both aspects, then integrating the information obtained to explain the connection between culture and science. Through this approach, the researcher aims to provide new insights into the application of physics principles within the context of traditional culture.

C. Results and Discussion

The research on *Hombo Batu* as a traditional art form from South Nias, which can be explained by the laws of physics, shows that while this art holds significant cultural value, the technique of stacking large stones in the structure actually involves several profound physics principles. The main findings from this research are as follows:

1. **Understanding the Principle of Static Equilibrium**

One of the key findings from this research is the recognition that the arrangement of stones in *Hombo Batu* follows the principle of static equilibrium as explained by the laws of physics. Static equilibrium occurs when the sum of forces acting on a system is zero, and this is clearly seen in the art of stone stacking. The stones are arranged in a way that they support each other without shifting or collapsing because the gravitational force acting on each stone is balanced by the normal force from the stone beneath it. This principle highlights how the traditional method of stone stacking intuitively applies fundamental physics to achieve stability, even in the absence of modern construction techniques or adhesives.

Newton's Laws (Equilibrium) Based on Newton's first and second laws, the stones in "Hombo Batu" remain in a stable position because no external forces are altering their placement. According to Newton's First Law (the law of inertia), an object will remain at rest or in uniform motion unless acted upon by an external force. In the case of "Hombo Batu," once the stones are arranged, they will stay in place as long as there are no disruptive external forces acting on them**.** Newton's Second Law (force and acceleration) states that the force applied to an object causes it to accelerate, and this force is proportional to the mass and acceleration (F = ma). In the context of *Hombo Batu* the larger or heavier stones exert greater pressure on the smaller stones below them. However, this force distribution does not cause damage or shifting as long as the stones are properly stacked. The weight of each stone is supported by the one beneath it, ensuring the balance and stability of the entire structure.

By applying these Newtonian principles, the *Hombo Batu* art demonstrates an inherent

understanding of how forces and equilibrium work in a physical system, ensuring that the stacked stones remain intact and stable over time.

2. The Influence of Friction on Structural Stability

This research also found that friction plays a crucial role in maintaining the stability of the stone arrangement. The rougher the surface of the stones, the greater the frictional force that occurs between the stones, which helps prevent movement or displacement of the stones. Even though no adhesives are used, sufficient frictional force can ensure that the stones remain in place.

The coefficient of friction of the stones used in *Hombo Batu* is high due to the rough surfaces, and the friction between these stones helps to prevent them from shifting under external forces. As the stones are carefully arranged, the frictional forces between them resist the motion that might otherwise cause the structure to collapse. This natural form of binding, relying purely on the physical interaction between the stones, contributes significantly to the overall stability of the *Hombo Batu* structure, demonstrating how physics principles are applied in this traditional practice.

3. Pressure Distribution in the Stone Structure

This research also identified that the distribution of pressure on the stones within the *Hombo Batu* structure is crucial to ensuring that the lower stones do not suffer damage from excessive weight. The pressure exerted on each stone in the system is evenly distributed thanks to the careful arrangement and shape of the stones.

The Principle of Pressure in Physics: Pressure in physics is defined as force per unit area (P = F/A). When heavier stones exert pressure on those below them, the structure is designed to distribute this pressure evenly across the surface area of each stone. The carefully arranged stones allow each stone to bear its share of the load without causing damage or breakage. This principle of pressure distribution ensures the longevity and stability of the *Hombo Batu* structure, demonstrating how an understanding of physical laws, such as pressure and force distribution, is applied in the traditional practice of stone stacking. The result is a robust system where the stones stay intact under the weight of others, maintaining the overall stability of the structure.

4. Analysis of Stone Structure Stability

Another significant finding is the understanding of how the stability of the stone structure in *Hombo Batu* can be explained through the principles of mechanics. Each stone in this structure is in a state of stability due to the balanced distribution of forces and the interlocking shape that supports each stone. The people of South Nias intuitively understand this concept when practicing stone stacking.

Structural Analysis and Material Strength Using material mechanics theory, it can be explained that larger stones serve as supports for the smaller stones above them, with each stone supporting the others to prevent the collapse of the structure. The stones are arranged in a way that, when properly stacked, the load distribution

becomes even, maintaining the overall strength and stability of the structure.

The application of mechanical principles such as load-bearing capacity, force distribution, and material strength in *Hombo Batu* highlights the sophisticated understanding of engineering embedded in this traditional practice. This intuitive design ensures that the structure remains resilient and stable over time, even without modern construction techniques.

5. Traditional Skills Based on Physics Knowledge

Through this research, it was found that the people of South Nias have developed skills that are based on an intuitive understanding of physics. Although they do not have formal knowledge of physics, their skills in selecting stones, arranging them, and creating stable structures demonstrate a profound understanding of physical laws. They apply principles of equilibrium and forces instinctively to ensure the stones remain stable.

These traditional skills reflect an intrinsic knowledge of key physics concepts, such as static equilibrium, force distribution, and friction, even though the community does not rely on formal scientific education. This highlights how cultural practices like *Hombo Batu* not only preserve local traditions but also embody a deep, practical application of physical principles that have been passed down through generations. This connection between traditional craftsmanship and physics knowledge shows how indigenous practices can provide valuable insights into the natural world and demonstrate a natural form of engineering.

Practical Skills in Applying Physics The people of Nias do not rely solely on physical strength when stacking the stones but also make use of physical principles such as friction and pressure distribution to ensure the stability of the *Hombo Batu* structure. This reflects practical skills that are closely linked to scientific knowledge, even though they have not been formally taught. Their ability to intuitively apply these principles demonstrates a deep understanding of the physical forces at play in the construction process. For example, by choosing rough stones and carefully arranging them, they maximize friction between the stones, preventing them from shifting or collapsing. Additionally, they ensure that the pressure is evenly distributed across the stones to avoid damage to the lower layers. These practical skills are an embodiment of a sophisticated, though informal, application of physics, showcasing how traditional knowledge and cultural practices can align with scientific principles without formal instruction.

From the findings of this research, it can be concluded that *Hombo Batu* is a traditional art that not only holds significant cultural value but is also based on the application of relevant physical laws. Principles such as static equilibrium, friction, pressure distribution, and structural stability analysis can explain why the stone stacking art of *Hombo Batu* remains strong and stable without the use of adhesives. The people of South Nias practically apply this physical knowledge in their daily lives, demonstrating that this traditional art is a unique example of the application of scientific principles within local culture. This

shows how traditional practices like *Hombo Batu* go beyond mere craftsmanship; they are a form of indigenous engineering that embodies the integration of cultural heritage and scientific understanding, passed down through generations. This connection between tradition and science highlights the wisdom embedded in local practices and their ability to solve practical challenges using natural laws.

D. Conclusion

Discussion

Hombo Batu is one of the most valuable forms of traditional architecture from South Nias, Indonesia. This art involves arranging large stones in a stable formation without the use of adhesives or other additional materials. This structure not only serves as an aesthetic and symbolic element, but also demonstrates a profound understanding of physical principles, even though the creation of *Hombo Batu* is done traditionally. This discussion will explain how the laws of physics elucidate the stability and mechanisms behind the stone arrangement in the art of *Hombo Batu*.

1. Static Equilibrium in the Hombo Batu Structure

In physics, static equilibrium occurs when an object does not move or change its position. The forces acting on the object are balanced, so no movement takes place. *Hombo Batu* essentially follows the law of static equilibrium, where large stones are arranged in such a way that the gravitational force pulling the stone downwards is balanced by the normal force provided by the stones underneath.

a. Newton's First Law (Law of Inertia) explains that an object at rest will remain at rest, and an object in motion will continue moving at a constant velocity unless acted upon by an external force. In the context of Hombo Batu, the carefully arranged large stones remain in a stable state without shifting or collapsing because the forces acting on them are balanced.
b. Newton's Second Law (Law of Acceleration) indicates that a change in the motion or position of an object occurs if the force acting on it is greater than the force it is receiving. In this case, the stones are arranged in such a way that each stone supports the one above it, maintaining balance and preventing the structure from collapsing.

The strong and stable *Hombo Batu* structure, despite being arranged naturally, is an example of the application of static equilibrium in everyday life.

2. Friction as a Key Factor in Stability

One of the most important principles of physics in *Hombo Batu* is friction. Friction acts on surfaces that are in contact with each other and tends to resist the relative motion between two objects. In the structure of *Hombo Batu*, each carefully arranged large stone experiences friction with the others, generating a frictional force that is crucial for maintaining the overall stability of the structure.

a. Coefficient of Friction

The frictional force between two stones depends on the roughness or smoothness of their surfaces. The rougher the stone's surface, the greater the frictional force,

making it harder for the stones to shift. Therefore, selecting stones with rough surfaces and arranging them with high precision is essential to ensure that the stones stay in place.

b. The Role of Friction in Preventing Movement

Essentially, friction helps prevent the stones from shifting, which is crucial for the stability of the *Hombo Batu* structure. Without sufficient friction, the stone structure would be prone to shifting or collapsing if external forces or loads are applied to it.

3. Pressure and Load Distribution in the Stone Structure

In Hombo Batu, larger stones serve as supports for smaller ones. The gravitational force pulling the stones downward generates pressure on the lower stones. The principle of evenly distributed load or pressure is key to ensuring the stability of this structure.

a. Pressure (P = F/A)

Pressure is the force exerted over a specific area. In *Hombo Batu*, the pressure experienced by the stone beneath is caused by the weight of the larger stone above it. Although these stones vary in size and weight, proper load distribution ensures that each stone does not receive excessive pressure, which could cause damage or collapse.

b. **Material Strength**

The stones in *Hombo Batu* are chosen based on their durability and strength to withstand pressure and load. Stronger stones can bear greater pressure without cracking or breaking, thereby maintaining the overall stability of the structure.

4. **Geometric Analysis and Structural Stability of the Stones**

Each stone in *Hombo Batu* is strategically placed following specific geometric shapes that support the overall stability of the structure. The arrangement of these stones takes into account the center of mass and geometric form to create stability.

a. Center of Mass

For the stone structure to remain stable, the center of mass must be located above a sufficiently large supporting area. Heavier and larger stones are typically placed at the bottom, while smaller stones are placed on top. In this way, the overall structure's center of mass remains at a stable point, preventing imbalances that could lead to the collapse of the structure.

b. Robust Geometric Design

The stone structure, arranged in a specific pattern, can also ensure additional stability. The arrangement of stones utilizing geometric principles, such as pyramidal or conical stacking, provides better stability due to more evenly distributed load.

5. **Traditional Knowledge Based on Physics**

One of the most intriguing aspects of this study is how the people of South Nias have traditionally mastered principles of physics, despite lacking formal scientific education. The art of Hombo Batu contains knowledge directly related to physics, passed down through generations via experience and practical skills.

a. **Empirical Learning**

The people of South Nias learned how to arrange stones through direct experience and observation of both stable and unstable structures. They observed how larger stones provide better support and how rougher

stones create greater friction to maintain stability.

b. **Adaptation to the Environment**

The stone arrangement technique is also an adaptation to their natural environment, which requires resistance to heavy loads and unpredictable weather. The careful selection of stones and precise arrangement demonstrate that principles of physics are practically applied in their daily lives.

The traditional art of Hombo Batu from South Nias is not only an example of cultural beauty but also a real-life illustration of how the laws of physics are applied in everyday life. The people of Nias have developed stone arrangement techniques that leverage principles of static equilibrium, friction, pressure distribution, and geometry to create strong and stable structures without the use of adhesives. This structure demonstrates that traditional art is not only aesthetic and symbolic but also reflects a deep scientific understanding of nature and physical mechanics.

Through Hombo Batu, we can see how complex scientific knowledge can be integrated with rich cultural traditions, creating a work that not only stands the test of time but also imparts scientific values that are relevant to human life.

D. **Conclusion**

Conclusion

The traditional art of Hombo Batu from South Nias is an exceptional example of the application of physical principles in local culture. Although no adhesive materials are used, the technique of arranging stones in Hombo Batu demonstrates the implementation of laws such as static equilibrium, frictional forces, pressure distribution, and structural analysis to maintain the stability and strength of the building. The people of South Nias have intuitively understood these concepts and applied them when arranging large stones to create structures that are stable and durable. Thus, Hombo Batu not only holds great cultural value but also serves as a practical example of the application of physics based on traditional knowledge, which is highly relevant to modern science.

Suggestions

1. Preservation of Traditional Knowledge

It is essential to preserve the knowledge of the stone arranging technique in Hombo Batu as part of the cultural heritage of South Nias. This can be done through documentation and teaching the younger generations to ensure its continued existence.

2. Application in Education

Knowledge of Hombo Batu can be used as teaching material in physics and cultural education, explaining the connection between art and physics within the context of local culture. This will help improve students' understanding of the application of physics in everyday life.

3. Development of Further Research

Further research is needed to analyze various Hombo Batu structures to gain deeper insights into the materials and techniques used, as well as their application in modern sustainable architecture.

4. Innovation in Modern Construction.

The physical principles embedded in the stone arranging technique of Hombo Batu can be adapted to develop environmentally friendly construction technologies that are more efficient in material use, while also enhancing the resilience of buildings against natural disasters. By incorporating the understanding of static equilibrium, friction, pressure distribution, and structural stability seen in Hombo Batu, modern architecture could innovate in ways that prioritize sustainability, reduce reliance on adhesives and non-renewable materials, and

improve structural integrity in the face of environmental challenges such as earthquakes or heavy winds. This fusion of traditional knowledge with modern engineering could result in construction methods that are both innovative and deeply rooted in local cultural heritage.

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