"Mamuli" Pattern in East Sumba Woven Fabric as Inspiration For "Kandunnu" Standing Lamp Using the IMOE Method

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Received	Reviewed	Revised	Published
19.08.2023	21.08.2023	28.08.2023	31.08.2023

https://doi.org/10.61275 /ISVSej-2023-10-08-06

Abstract

Inspiration is a crucial factor in the conception and development of innovative design products. In the contemporary creative world, an innovative product transcends mere aesthetic factors, encompassing intrinsic values.

This study investigates a framework for transforming *Mamuli* pattern, found in East Sumba woven fabric, into a contemporary and innovative product, in the form of a standing lamp. This effort aimed to guide designers and design students in the precise and effective transformation of local culture.

Innovation was done through materialization, observation and experimentation (IMOE). They were applied to cultural artifacts, structured across four levels, namely the inner, middle, outer, and experimental. The experimental element assumed a central role in the methodology. The inner level encompassed the meanings and symbols of the cultural artifact (*Mamuli* pattern), while the middle level involved its creative process. The outer level represented the physical appearance, including materials, colors, and ornaments. The experimental element involved the creative process of transforming the cultural artifact into a contemporary form.

The experiment targeted designers and design students, facilitating the creation of contemporary products through a culturally-sensitive transformation, fostering innovations. Developed through an ethno-mathematical theory and experimental folding techniques, it generated experimental innovative product designs. It transformed *Mamuli* pattern from East Sumba woven fabric into Kandunnu standing lamp, drawing inspiration from both the outer and inner levels.

Keywords: Cultural inspiration, Creativity, Cultural product design, Cultural product model, IMOE method, Design activity.

Introduction

Indonesia is endowed with diverse unique natural, cultural, and traditional elements, fostering its inhabitants to appreciate the creative work of art. Consequently, the Creative Industry in Indonesia is a sector that harnesses individual creativity, skills, or talents to transform creations into well-being and employment opportunities for both creators as well as the broader society (Mellita & Erlansyah, 2014). According to Presidential Instruction No. 6 of 2019, the creative economy is described as "economic activities based on the creativity, skills, and talents of individuals to generate economically valuable creations that impact the Indonesian society welfare" (Gumulya & Meilani, 2022:8-15). In the global market, innovative products should transcend mere aesthetic values. Therefore, an effective strategy involves incorporating local culture into innovative works. This strategic emphasis aligns with the focus of the Indonesian since 2006 on design as a pivotal sub-sector within the creative industry (Simatupang, 2008).

This study underscored the pivotal role of inspiration in the standing lamp design, building on previous conclusions that exposing designers to various forms of inspiration significantly enhanced their creativity in the design process (Cheng et al., 2014). In the modern era, both local and international designers frequently draw inspiration from local culture or ancient cultural artifacts for creativity (Luo & Dong, 2017). This infusion can amplify values, meanings, and even stimulate emotional pleasure (Moalosi et al., 2007). In essence, it cultivates an appreciation for indigenous heritage, which should be embraced by students and designers alike (Boonpracha, 2022). Local culture or ancient artifacts serve as a wealthy and potent source of inspiration for contemporary products, possessing local distinctiveness and catering to the needs of the local tribe (Luo & Dong, 2017).

In this context, this study employed, *Mamuli* pattern from the East Sumba woven fabric as a foundational inspiration for the creation of a Kandunnu standing lamp. It addressed the following question. What research and development methodology for contemporary products can aid the creative process of designers in creating a culturally rooted contemporary product, specifically a standing lamp?

Its aim is to establish a framework for the research and development of contemporary products, drawing from local culture for inspiration. It also intends to contribute to the revitalization of local culture, and extend an enabling methodology to designers worldwide, fostering the transformation of local culture into culturally distinctive contemporary product development.

Its objectives are as follows.

1. To investigate the niche of Mamuli Pattern East Sumba Woven Fabrics.
2. To introduce the use of the IMOE method to transform Mamuli Pattern East Sumba Woven Fabrics into Kandunnu Lamp.
3. To create a framework for research and development of contemporary products inspired by local culture.
4. To create a contemporary standing lamp that evoked appropriate mood and meaning, in accordance with the objective of the study to explore the Middle, Experiment, and Outer levels of the IMOE method.

Theoretical Framework

1. Cultural Inspiration

Culture holds significant importance in the creative design process, necessitating a clear comprehension of its definition. According to Leong & Clark (2003), it signifies the living activities of a society, encompassing valued ways of life and symbolic structures. Another definition describes it as encompassing the intellectual faculties of creation, perception, and emotion (Koentjaraningrat, 2010). Based on these definitions, culture emerges as a wellspring of creative values and emotional identities within design. The relationship between culture and design is profound, wherein cultural design enhances the value of a product; design serves as a means to promote cultural uniqueness (Lin, 2007).

Cultural inspiration effectively conveys local culture, triggering designers to generate ideas and establish a creative design process. Acknowledged as a crucial aspect of a design process (Eckert & Stacey, 2000), cultural inspiration fosters a robust connection with design, giving rise to a new concept termed "Cultural Product Design" (CPD). This concept involves re-imagining or reviewing the features of ancient cultural artifacts and adapting into contemporary product designs with functional and aesthetic aspects (Luo & Dong, 2017)

Previous studies have emphasized the importance of two critical elements when designing contemporary products with cultural inspirations, namely cultural philosophy and creative learning for designers (Asino et al., 2017). Busch also identified Local Wisdom or culture as a crucial component in the process of teaching product design, which should be understood by the designers (Busch, 2002). Similarly, in CPD, Kezia Langi has mentioned that creating a contemporary product involved a creative process necessitating rethinking and redefining cultural elements through creativity. This process generates new products in line with the evolving creative industry, while preserving culture and aesthetics (Langi et al., 2020).

In conclusion, experts have identified cultural inspiration as an appropriate strategy in the creative process, leading to the production of contemporary products. In this study, Kandunnu standing lamp served as a contemporary product generated from cultural inspiration. However, designers should avoid merely replicating ancient cultural artifacts as inspiration. Previous investigations have focused primarily on theory and methodology, with limited exploration of the experimental process, while some analyses have presented data obtained from student groups. To address this, several unique innovations were introduced: (1) Cultural inspiration from the distinctive pattern of East Sumba Woven Fabric, a material previously limited to textiles; (2) The integration of an experimental element into the IMO method, resulting in IMOE; and (3) Explanation of the cultural features that hold significance and inspire the creation of Kandunnu standing lamp.

2. Ethno-mathematics

Ethno-mathematics, introduced in 1977 by D'Ambrosio, a Brazilian mathematician, originated from the word "ethno," signifying something broad and pertaining to socio-cultural contexts, "mathema" which means explaining, knowing, comprehending, and engaging in activities, and "tics" derived from "techne," meaning technique (D'Ambrosio & Rosa, 2008). Ethno-mathematics is the study of mathematics within a cultural context, encompassing the understanding and reasoning of mathematical systems used (Wahyuni et al., 2013). Another definition by Shirley characterized it as mathematics that emerges and evolves within a society, aligning with the local culture and integral to learning and teaching processes (Shirley, 1995). Moh. Zayyadi identified the closeness of this concept with culture, emphasizing that ethno-mathematics encompasses various mathematical concepts developing within a tribe, including those manifested in cultural artifacts, such as temples, traditional tools, fabric patterns, and settlement patterns (Zayyadi, 2018).

3. Traditional Patterns

Indonesia as an archipelago has many traditional paterns is an intellectual property that has developed since prehistory which is commonly known as the archipelago pattern. Patterns are influenced by several factors, namely the natural environment, flora and fauna, and the people who inhabit it. (Kuntjoro-Jakti, 2010). As in the patterns that exist in East Sumba woven fabrics, East Sumba patterns in one fabric usually have more than one motif, based on sources. The motifs are in the form of mamuli motifs, chickens, pigeons, horses, turtles, and crocodiles (Wulandari & Nuhamara, 2020).

In the book Chandra Kirana Prijosusilo (2017) states that every symbol and motif that is on a piece of cloth is a hope and prayer conveyed through the cloth, therefore fabrics and motifs are unique as a work of art. (Prijosusilo, 2017).

Literature Review

In Indonesia, several reseach have investigated *Mamuli* pattern and East Sumba Woven Fabric. However, a comprehensive exploration of the pattern as a source of creative inspiration for contemporary product creation has not been extensively undertaken. Majority of these studies have focused primarily on the history and functions of *Mamuli* as sacred objects for the Sumba tribe. For instance (Lokal, 2021) explains that it was a distinctive cultural element used as dowry in Sumba. Geirnaert (1989) further elaborates that *Mamuli* represented a tribute to women. It is carried along with other sacred tools and weapons, exclusively by the first-generation ancestors, and part of the Pustaka is stored in the attic. According to Steveb & Yunanto (2019) *Mamuli* holds significant importance as a valuable dowry when a groom proposes to a bride(Steven & Yunanto, 2019) . An article titled *"Eksplorasi Tenun Ikat Sumba Timur ditinjau dari Etnomatematika* (Exploration of East Sumba Woven Fabric through Ethnomathematics)" emphasizes on the occurrence of geometric mathematical activities within the Sumba woven fabric pattern (Wulandari & Nuhamara, 2020).

Focusing on cultural features as inspiration, this study posit that in the current global-local market era, a harmonious and clear relationship has flourished between culture and contemporary design. For contemporary design, culture enhances the value of aesthetic experience and adds value to globally competitive products (Wu et al., 2004). According to (Boonpracha, 2022), the reciprocal relationship between design and culture over time has transformed design into a reflection and tangible outcome of local culture used as inspiration. Other investigations defined local wisdom or culture as an essential component in the process of teaching product design, which should be understood by the designers (Busch, 2002). Langi et al. (2020), emphasize the crafting of contemporary products as entailing a creative process necessitating rethinking and redefining cultural elements through creativity, yielding new products that align with the evolving creative industry while preserving culture and aesthetics. When embarking on the design of a contemporary product fueled by cultural inspiration, two crucial elements warrant investigation, namely cultural philosophy and features of contemporary products (Asino et al., 2017).

Several studies highlight the significance of connecting contemporary products with local wisdom, enhancing the value of aesthetic and emotional experiences for novel creations (Lin, 2007). In addition, Sugiarto et al. (2023) underscored how Batik, a traditional Indonesian textile, could be functionally transformed into an aesthetic element within modern interior design, creating an aesthetic connection between traditional textile art and modern interior design. Another cultural analysis centered on Javanese ornaments, imbued with aesthetic values taught by Islam, adds value to carving art design and boosts the local economy while preserving the eroding diversity of Javanese culture (Haryanto & Prameswari, 2023). Following conclusions were drawn based on the aforementioned studies:

1. *Mamuli* held sacred significance for the Sumba tribe.
2. Local or traditional culture was a suitable source of creative inspiration, adding value to contemporary products.
3. Designers needed to analyze both local cultural and contemporary product design features, merging them to create amazing contemporary products

Amidst the extensive investigation on *Mamuli* and local culture as inspiration for contemporary products, there is still a dearth of studies into suitable methods to aid designers in transforming cultural features into contemporary products, further enhancing their values. This study assumed a crucial role for developing the IMOE method into an indispensable tool for designers and design education globally.

Research Method

This study used a qualitative and Ethno-mathematics method in conjunction with the IMOE product approach for data analysis. This combination ensured the fulfilment of research objectives. A single case study approach was utilized to address the question of how and what was suitable for flexible examination. Ethno-mathematics method was employed in the initial stages to analyze the fundamental forms of east sumba woven fabric pattern. Subsequently, the

IMOE method guided the design process of creating standing lamp. This study divides process into 4 parts. 1) studying data from related documents and investigatioan on the value and patterns in east sumba woven fabric. 2) Collecting data and field surveys by taking puctures, recording important details for east sumba woven fabric. 3) Case studies and experiment were seleted applying a specific method, considering the criteria, experiment for selected folding paper in product design. 4) Design and development of the results of parts 1, 2, 3 applied to contemporary products in the form of standing lamps.

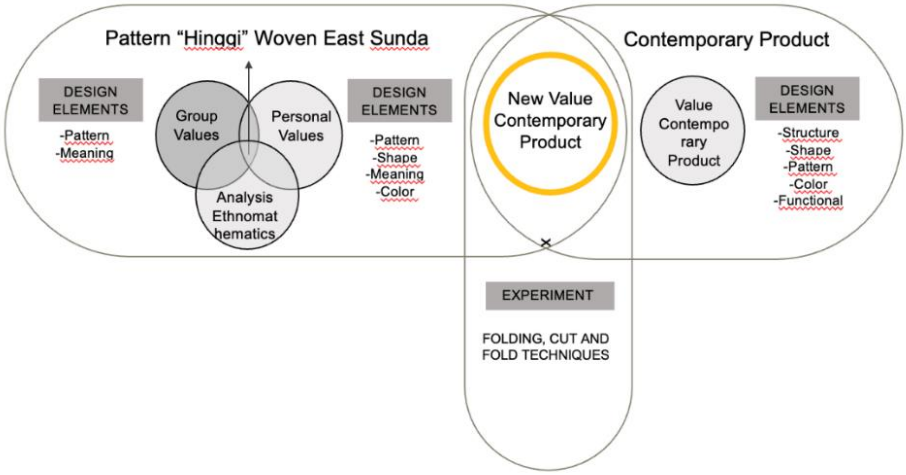


Fig. 1: Research Process
Source: modified from Kezia Langi

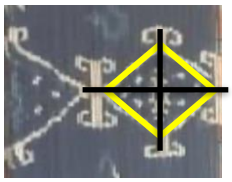
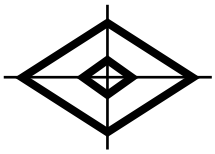
Case Study

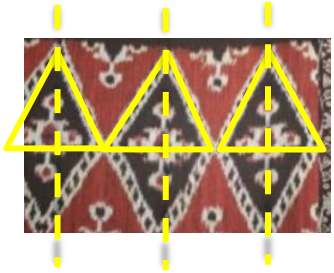
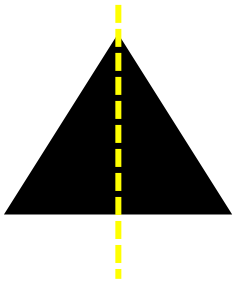
This study focuses on standing lamps *"Kandunnu Lamp"* with the aim that the lamp best represents contemporary products and can produce light and shadow that will create patterns in the space.

Findings

Previous studies have defined ethno-mathematics as mathematical concepts and practices existing within a society, deeply rooted in its own cultural life (Lisnani et al., 2020). An ethno-mathematical examination refers to the exploration and analysis of geometric concepts in wall decorations at Lesotho and surrounding areas of South Africa (Gerdes, 2001). According to (Barta & Shockey, 2006), this complex and dynamic representation show cultural influence on mathematical usage in practical applications. In this study, ethno-mathematics was used to identify the fundamental geometric shapes in East Sumba Woven Fabric pattern, establishing the groundwork for designing new shapes in Kandunnu standing lamp. The analysis of the pattern shape using ethno-mathematics is presented as follows (Halim, 2022).

Table 1: Ethnomathematical Analysis of East Sumba Woven Fabric Pattern
Source: (Halim, 2022)

Name of the Pattern and the Figure	Ethnomathematical Concept with Rhombus Geometric Shapes	Description
1. Crocodile Pattern (*Wuya*)  2. Tortoise Pattern (Karawulangu)  3. Floral Pattern 		The geometric shape of the rhombus can be found in the typical patterns of East Sumba woven fabric, such as crocodile, turtle, and floral patterns, which are dominated by white. This shape intersects in the middle, perpendicular to each other. Rhombus shapes of various sizes are present in crocodile, turtle, and floral patterns, and are combined to form distinct patterns.

Name of the Pattern	Ethnomathematical Concept with Triangle and Symmetrical Fold Concept	Description
1. *Patula Ratu* Pattern  2. *Mamuli* Pattern 		The triangle concept is frequently used in East Sumba woven fabric pattern, particularly in *Patula Ratu* and *Mamuli* patterns, which are specifically designed for Sumba women, symbolizing female fertility. This triangle pattern can also be found on East Sumba woven fabric. The symmetrical fold, depicted with a yellow dotted line, represents a mature mathematical concept in which the two parts of the fold close symmetrically when *Mamuli* pattern is folded along the yellow line. The triangle is also the most stable geometric shape.

Name of the Pattern and the Figure	Ethnomathematical Concept with Symmetrical Concepts and Reflective Mathematical Concepts	Description
1. Lion Pattern (*Mahang*)  2. Horse Pattern (*Njara*)  3. Rooster Pattern (*Manu)* 		The idea of symmetrical black lines and reflective mathematical concepts is identified in the properties of woven fabric, specifically in Lion, Horse, Rooster patterns. The transfer or shift of all object points in the same direction with the same distance is referred to as the reflective mathematical concept (Purnama et al., 2020). Lion and Horse patterns, whether separated by geometric patterns or not, clearly show the symmetric and reflective mathematical concepts. The X and Y lines, depicted with black lines, are also similar to the patterns found on East Sumba woven fabric.

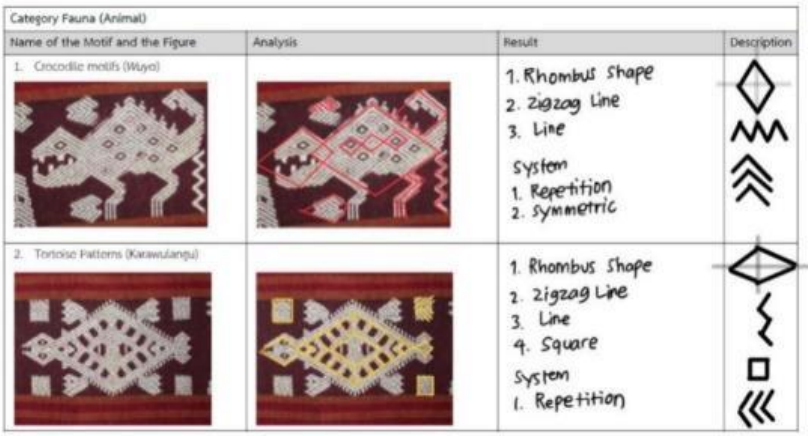


Fig. 2: Geometric Ethnomathematical Analysis on *Hinggi* Pattern Woven East Sumba
Source: Author

The ethnomathematical analysis above show that the rhombus shape was identified as the dominant form, and the mirror system was prevalent in the East Sumba woven fabric

pattern. *Hinggi* pattern of East Sumba woven fabric was thoroughly examined and dissected at this stage, encompassing both the geometric shapes used in the pattern and the design system. This exploration also show prevalent geometric features, including rhombuses, zigzag lines with repetition, and symmetrical systems. The rhombus geometric shape is used to develop a fresh contemporary product based on the data obtained.

3. IMO Method

The IMO method serve as a means of translating cultural elements into design elements, formulated by Leong & Clark (2003), with an ethno-mathematics approach. This method was modified based on an article titled "Transforming Local Culture into Contemporary Product Design using the IMO Method" (Gumulya & Meilani, 2022). The table below presents the concept of IMO within the context of culture and features of contemporary design.

Table 2: Description of IMO in Culture and Contemporary Design Features
source: personal documentation

Level	**Culture**	**Contemporary Design Features**
Inner	Inner Culture: • Spiritual meaning • Belief meaning Examples: Religion, cultural philosophy, and embraced values	Inner Contemporary Design: • Special content Examples: Special meanings and narratives embedded in the work
Middle	Middle Culture: • Human relationships and social organization	Middle Contemporary Design: • Function • Operational aspects • Utility
Outer	Outer Culture: • Physical or material culture Examples: Daily needs, transportation	Outer Contemporary Design: • Shape • Decoration • Details • Material • Color

The table above highlights that the inner element represents abstract cultural aspects, and the middle element encompasses broader cultural behaviors, while the outer and experimental elements offer effective flexibility for designers to interpret cultural elements from the inner and middle layers. CPD is expected to exhibit innovation and show a meaningful connection between local cultural and contemporary design elements, creating uniqueness and significance.

This adaptation enhanced the potential for more meaningful and innovative CPD. In accordance with previous investigations, a research framework with the following stages was necessary:

1. Identification
   - Outer Level: This entailed the analysis of tangible cultural elements, such as form, color, material, pattern, detail, and style. These components were observed in artifacts, traditional architecture, traditional dances, clothing, textiles, and traditional jewelry. Ethno-mathematics was employed for pattern analysis in the initial identification stage.
   - Middle Level: The analysis encompassed aspects like function, utility, behavior, and cultural habits related to these elements.

- Inner Level: The stage delved into elements such as values, beliefs, and cultural philosophies.
- Experimental Level: The analysis of the design process involved tracking the journey of creating a contemporary work, guided by the designer.

2. Implementation

This second stage involved the integration of the four levels, from the inner to the outer stage. Following diagram presents the stages of the IMOE method:

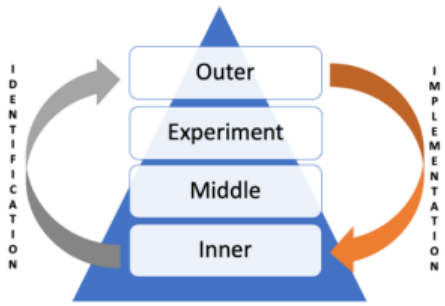


Fig.3: IMOE Method Diagram,
Source: Modification for Devanny Gumulya & Fanny Meilani, 2020

This diagram shows the implementation process, transitioning from the inner level to the outer. Following the identification of cultural elements, the process proceeds to analyze functions and materials used, and eventually advance to the experimental level. This stage is crucial for designers to explore elements of the outer level, including design aspects such as form, material, color, and detail.

Discussion

This case study focusedd on designing a contemporary standing lamp known as "Kandunnu," inspired by the traditional *Mamuli* pattern of East Sumba woven fabric. To fully understand the context, the history of woven fabric and *Mamuli* pattern was explored as follows:

1. *Ikat* Weaving Pattern

Woven fabric in Indonesia encompassed a variety of patterns, which usually characterized the tribe or region of origin. These patterns were created and used as initial ideas in crafting attractive ornaments that provided distinct first impression (Sunaryo, 2009).

2. Structural Principles of *Hinggi Ikat* Waving in East Sumba

Hinggi is meticulously designed, with patterns placed in harmonious patterns. Lines play a significant role in the composition of Sumba woven fabric designs. These lines are horizontal, dividing the fabric into sections, each designated for a woven fabric pattern. *Padua* (central plane) is situated in the transverse strip and center of the fabric. Various types of lines, such as straight, curved, broken, or dotted, appears on the fabric (Soeriadiredja, 2013).

3. *Hinggi* Pattern of *Ikat* East Sumba

Hinggi pattern is depicted symmetrically, divided into three parts, namely the upper, middle, and lower planes. This follows the principle of mirror imaging in Sumba woven fabric. An essential principle in composing *Ikat* pattern of East Sumba is the division of the fabric surface into three ambivalent fields. This trait demonstrates the relationship between the fields: top, middle and bottom (Soeriadiredja, 2013).

The Cosmos Division in *Hinggi Ikat* Weaving, East Sumba, is described as follows: *Hinggi* pattern is figurative groups inspired by the environment and local culture, encompassing images of living creatures (human, fauna, and flora), as well as natural objects such as jewelry

artifacts. The schematic pattern group, or pattern with openwork bases, consists of abstract patterns derived from local concepts and influenced by external sources (Indian, Chinese, Portuguese, and Dutch). The category of foreign-influenced themes integrates eco-cultural pattern from regions beyond East Sumba area, particularly India, China, Portugal, and the Netherlands. The Patola Ratu pattern, designed to cover the surface of the fabric sheet, along with figurative, schematic, and foreign-influenced pattern, reflects the impact of India (Anas, 2007).

Hinggi pattern is classified into two groups, separated by a geometric intermediate pattern path. Central pattern encompasses figurative pattern that carries both local and foreign influences, while foreign-influenced pattern replaces the central pattern, often in a larger size (Anas, 2007). It highlighted the process of transferring traditional pattern of East Sumba woven fabric and design of contemporary products from a cross-cultural perspective, as a strategy to enhance the value of new designs and products. Ultimately, valuable references for designers aiming to create cross-cultural contemporary products were also provided.

3.1. *Mamuli* Pattern

a b

Fig. 4: a. *Mamuli* Pattern, b. *Mamuli* Jewellery
Source: www.Google.com

Mamuli pattern is distinctive to Sumba Island, and the fundamental shape of the jewelry resembles a uterus or female genitalia, symbolizing femininity and fertility, intended to honor the position of women (Liliweri, 2018). *Mamuli* plays a crucial role in the traditional marriage customs of Sumba, serving as the main dowry and a symbol of reconciliation between men and women. This pattern holds significant influence over the harmonious relationship between the families of the bride and groom, signifying the utmost respect for Sumbanese women (Steven & Yunanto, 2019). Crafted from metal, this jewelry is believed to have celestial origins and considered sacred, hence, it is kept in locations believed to possess divine power (Kaka & Hidayat, 2021). Due to the profound uniqueness and philosophy, *Mamuli* pattern serves as a cultural inspiration for designing the contemporary Kandunnu standing lamp. The mapping of *Mamuli* pattern culture onto East Sumba woven fabric using the IMOE method was conducted as follows:

Identification Stage of Local *Mamuli* Pattern Cultural Elements

Table 3: Identification of Local *Mamuli* Pattern Cultural Elements
Source: Authors

IMOE (Element)	Description
Suku	The Sumba Tribe *(Orang Sumba – Tau Humba)* is one of the indigenous tribes inhabiting Sumba Island, Indonesia. Renowned for diverse cultural heritage, their most notable contribution lies in Sumba woven fabric, skillfully crafted using the Gedong tool and *Ikat* weaving technique (Rizki & Widyastuti, 2020).

Level Outer Artefak *Mamuli* Pattern	*Mamuli* Pattern in East Sumba Woven Fabric *Mamuli* holds a distinct cultural significance in Sumba, serving as adornment and as part of the dowry in Sumba culture (Lokal, 2021). It is also used as an offering in marriage and death ceremonies, symbolizing femininity and womanhood due to the resemblance to the female reproductive organ (P Soeriadiredja & Press, 2022). The selected *Mamuli* element for this study pertained to the pattern found in woven fabric, sharing the same form and meaning as *Mamuli* jewelry'
Level Middle	*Ikat* Woven Fabric from East Sumba *Hinggi* pattern is depicted symmetrically and divided into three parts, namely the upper, middle, and lower planes. This adheres to the principle of mirror imagery in Sumba woven fabric. An essential principle in arranging *Ikat* pattern in East Sumba involves segmenting the surface of woven fabric into three ambivalent fields, (top, middle, bottom) (Purwadi Soeriadiredja, 2013), highlighting their interrelated relationships. The following description outlines the Cosmos Division in *Hinggi Ikat* Weaving, East Sumba. *Hinggi pattern* consists of figurative groups from the local environment and culture, depicting living entities (humans, fauna, and flora) alongside natural objects such as jewelry artifacts. The schematic pattern group, characterized by openwork bases, includes pattern stemming from local concepts and external influences (Indian, Chinese, Portuguese, and Dutch) in abstract form. The category of foreign-influenced pattern comprises designs originating from eco-culture sources outside the East Sumba area, particularly India, China, Portugal, and the Netherlands. The Indian influence is evident in Patola Ratu pattern, designed to cover the surface of the fabric sheet, as well as figurative, schematic, and foreign-influenced patterns (ANAS, 2007). *Hinggi* pattern is divided into two groups, dramatically separated by a geometric intermediate pattern path. Figurative pattern, encompassing both local and foreign influences, is termed central patterns, with foreign-influenced pattern occupying the central pattern position, often depicted on a larger scale (Anas, 2007)
Level Inner	Meaning and Purpose of *Mamuli* Pattern In Sumba society, *Mamuli* serves as part of the dowry, symbolizing peace between the bride and groom, as well as fertility and femininity. In tribe life, *Mamuli* is often associated with social status, manifested as large-sized ear ornaments adorned with complementary ornamentation. As jewelry defines human civilization, *Mamuli* is believed to symbolize identify and Sumba culture. The fundamental shape of *Mamuli* jewelry, resembling the female reproductive organ, holds symbolic significance in honoring the role of women (Lokal, 2021).
Level Experiment	In this stage, the Sumba tribe continues to uphold traditional practices passed down through generations and preserved within the minds of Sumba artists.

The Identification stage of the local *Mamuli* pattern Culture in East Sumba woven fabric aimed to show the depth and levels of meaning within the local culture. This could be subsequently integrated into the design of Kandunnu standing lamp.

Implementation Stage of Local *Mamuli* Pattern Cultural Elements

This study necessitated an analytical model for crafting a new contemporary product, ensuring the seamless integration of inspiration from the local *Mamuli* pattern culture of East Sumba woven fabric into the existing Kandunnu standing lamp. To achieve this, the VIEW model was employed, encompassing Visibility, Information, Emotional Appeal, and Workability (Pramesti, 2021).

Table 3: Implementation of Local *Mamuli* Pattern Cultural Elements
Source: Authors

IMOE (Element)	Description	
Emotional Appeal	Local Cultural Meaning	Contemporary Meaning
	• Social Status Indicator • Personal Identity • Precious Object	This study primarily focused on standing lamp, a contemporary product inspired by *Mamuli* pattern of East Sumba woven fabric. The contemporary significance of this product included: • Illumination • Room Status Indicator • Space Enhancement • Creation of Ambiance
Visibility	Visibility Analysis was carried out to dissect the use of design elements for the product, as outlined below: 1. The basic geometric shape was a rhombus. 2. The color was a natural metal shade of silver. 3. The chosen material was metal, akin to the belief held by the Sumba tribe that metals originated from heavens, similar to *Mamuli* jewelry. *Mamuli* within the pattern used either light or dark colors based on the background color of woven fabric. 4. The experimental construction evoked the folding of paper and dynamic movement. 5. The pattern is characterized by repetition and mirroring. 6. Used Modular and Repetitive Proportions 7. The placement followed ceremonial practices and was reserved for significant locations.	
Information	Both the traditional and contemporary patterns, along with their meanings, were visually apparent.	
Workability	Both can be moved, touched, carried, and stored.	

After analyzing both the cultural and contemporary design elements from woven fabric, the design concept was aligned with the elements obtained from the IMOE analysis. Kandunnu standing lamp draws inspiration from the Outer, Inner, and Experimental levels to provide illumination, creating an ambiance in a room. In the present context, contemporary standing lamps transcend the conventional roles of providing artificial light or decoration, but have evolved to creating an ambiance and evoking mood in a space. This is similar to the numerous functions of *Mamuli* pattern on fabric, jewelry, holding profound significance for its owner.

Development Stage of Kandunnu Standing Lamp

Kandunnu Standing Lamp

The term "Kandunnu" is a pattern name discovered in East Sumba woven fabric, symbolizing stars and hope. It has been transformed into a contemporary design through a process of adaptation. This transformation involves incorporating the rhombus shape and repetetive modules of *Mamuli* patterns, aligned with the distinctive characteristics of patterns observed in woven fabric, and the concepts experimented with folded paper. The innovation behind this chandelier lies in its large shape, characterized by repetition. The shape of a modern pattern is manipulated to enlarge and shrink, thereby producing striking and dynamic shadows.

Kandunnu is a contemporary standing lamp meticulously designed with the keywords sophisticated, luxury, and communicative. These terms are rooted in local culture, wherein

"sophisticated" reflect the meaningful and captivating tradition of the fabric pattern. "luxury" is represented by the use of silver color, attributed to the belief that metals are divine gifts, while "communicative" relates to the dynamic pattern movement, similar to the continuous growth of the pattern and woven fabric. Resembling a blooming flower, the lamp serves to facilitate the ongoing development of both the pattern and the fabric, within Indonesia and on a global scale. The design process of Kandunnu standing lamp unfolds as follows:

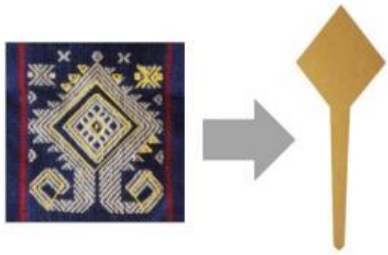


Fig. 5. Transformation of *Mamuli* Pattern Shape
Source: Authors

In the first stage of development and implementation, a transformation process was employed to craft a novel contemporary form. The basic rhombus shape of the pattern, analyzed using ethno-mathematical methods, underwent further contemporary transformation.

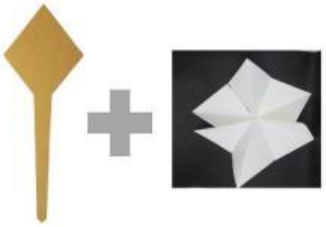


Fig. 6. Experiment with Folding Paper
Source: Authors

The second stage entailed a deeper exploration of the newly acquired form through an experiment of folding paper, using techniques pioneered by Paul Jackson. This combination aimed to generate a new shape and suitable system for application in Kandunnu standing lamp. This progression draws inspiration from the role of *Mamuli* as a ceremonial gift in Sumba weddings. By adopting this approach, the initial two-dimensional *Mamuli* pattern evolved into a three-dimensional configuration.

The third stage of development and implementation encompassedd the concluding steps of weaving the fabric and creating a *Mamuli* pattern. A fundamental concept of geometric transformation was identified from the pattern observed, encompassing dilation, rotation, reflection, translation, and repetition. This stage signified the expenditure of design and form exploration. Kandunnu standing lamp appliedd these geometric transformation concepts to craft its design.

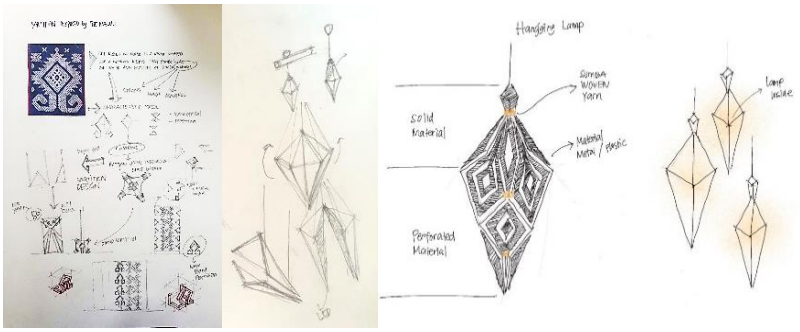


Fig. 7: Initial Sketch of Kandunnu Standing Lamp
Source: Authors

The process advanced to the model exploration stage at a 1:1 scale to evaluate the successful integration of local *Mamuli* pattern, an inspiration guiding the crafting of the lamp. This assessment was carried out through card-board cut using a laser cutting system.

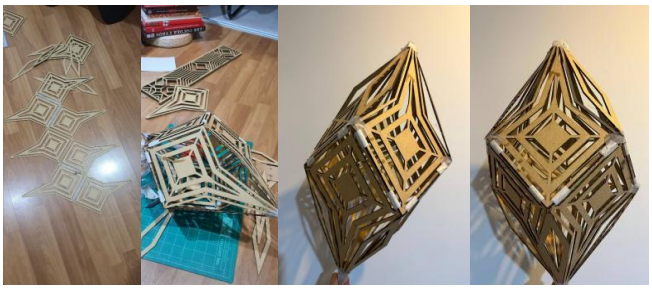


Fig. 8: Initial Prototype of Kandunnu Standing Lamp
Source: Authors

The above prototype clearly showes how *Mamuli* pattern inspired the design of Kandunnu standing lamp. This is further described as follows:

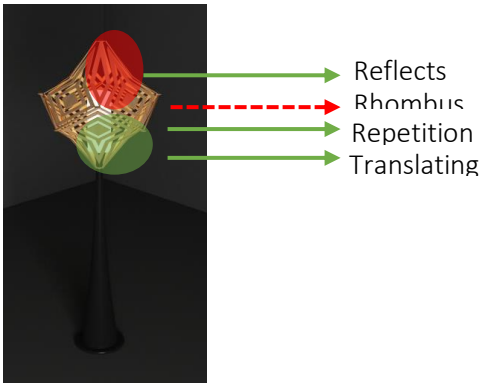


Fig. 10: Implementation of Ethnomathematical Analysis
Source: Authors

The uniqueness of Kandunnu standing lamp goes beyond being a contemporary embodiment of *Mamuli* pattern. It lies in the interplay of light and shadows that transform a room, resembling the interplay of light and lamp-generated shadows on woven fabric pattern. This distinctiveness adds significant values, creating new philosophical meanings and effects. The design finalization stage encompassed all the previously mentioned stages and experiments, guiding Kandunnu standing lamp into the production stage. This is detailed as follows:

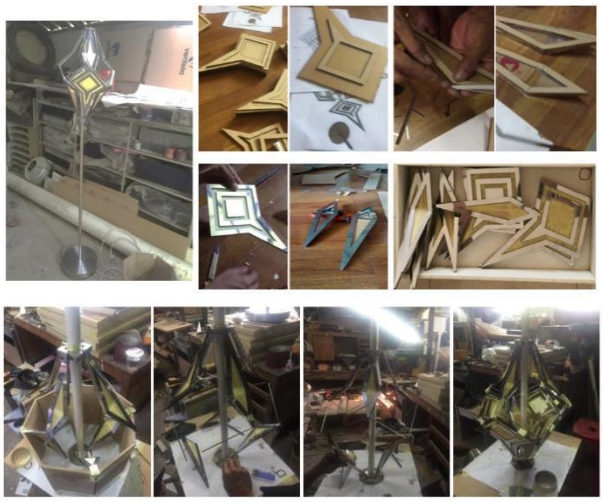


Fig. 11: Production Process of Kandunnu Standing Lamp
Source: Authors

Fig. 12: Final Kandunnu Standing Lamp
Source: Authors

The form and material of the lamp embody a philosophy aligned with the meaning of "Kandunnu," which signifies a star, a symbol of hope believed by the Sumba tribe. To incorporate contemporary elements, the lamp integrates the "blooming flower" system, implemented through an automated adapter. This adaptation encompasses the teachings of the Sumba tribe, wherein metal, the selected material for this lamp, is considered a gift from God. Kandunnu standing lamp aims to convey the revered *Mamuli* pattern of the Sumba tribe, leading it into the modern world while also preserving the allure of Indonesian local culture. This endeavor can continuously captivate young designers and inspire innovative designs.

Suggestions for Cultural Product Designers and Design Education

This study introduced a method applicable to both designers and design education. The results underscored the significance of the Inner, Outer, and Experiment levels in the process of designing contemporary products inspired by local culture, rich in uniqueness and profound meaning. It was equally important for designers and design students to thoroughly examine each feature of local culture, primarily focusing on the Inner and Outer Levels, before embarking on the design of cultural products. The Experimental Level held its importance, ensuring the resultant work was not merely a replica of the local culture that sparked inspiration. The IMOE method served as a solution for designers and design education when it comes to the design of cultural products.

Conclusions

In conclusion, East Sumba woven fabric could be likened to a painting, with each fabric sheet being distinct and holding significant artistic value through its originality and ancestral

importance (Prijosusilo, 2017). This study successfully developed the IMOE design method and making Kandunnu lamps which transformed local culture into contemporary products. The essence of this innovation lied in the incorporation of the Experimental Level and supplementary indicators into the design process, encompassing both the Inner and Outer Levels. This integration resulted in fresh innovations within the process of designing contemporary products. The methodological approach and process employed in designing Kandunnu standing lamp could elevate East Sumba woven fabric, particularly *Mamuli* pattern, to a global stage. It could also aid the Sumba tribe, not only in fabric production but in crafting various contemporary products in the future. The innovation of this method is depicted in the following diagram.

Table 4: IMOE Method Development Table
Source: Authors

IMO by Leong & Clark 2003		**IMOE 2023 Research**	
Level	**Local Culture**	**Contemporary Design Features**	**Contemporary Design Features**
Inner	Inner Culture Elements: • Spiritual meaning • Beliefs meaning Such as: Religion, cultural philosophy, and adopted values	Emotional Appeal: The contemporary product in this study was standing lamp inspired by *Mamuli* pattern of East Sumba woven fabric. Its contemporary significance included: • Illumination • Room Status Indicator • Enhancement of Space • Creation of Ambiance	
Middle	Middle Culture Element: Human relationships and social organizations	Information: Both the pattern and its meanings were visibly evident in traditional and contemporary contexts.	Workability: Both could be moved, held, carried, and stored
Outer	Outer Culture Element: • Physical or material culture Such as: Daily necessities and transportation	Visibility: • The basic geometric form was a rhombus shape • Natural metal color used was silver • Metal material was believed to come from the sky for *Mamuli* jewelry, while bright or dark colors were used based on the background color of woven fabric for the pattern. • Experiment with folding paper construction and movement • Repeating pattern, mirroring • Modular and repeating proportions • The layout of both was placed in important ceremonies and locations	
		Experiment	Kandunnu standing lamp was created through paper folding experimentation technique.

Mamuli pattern of East Sumba woven fabric is a unique cultural heritage of Indonesia. In this research, it was meticulously designed through the IMOE method, and further developed drawing inspirations from the Inner, Outer, and the essential addition of the Experimental level. The results show that local cultural inspiration could influence design performance and creativity. These various levels play a pivotal role in effectively transforming the local cultural features and contemporary product features into a new and meaningful work. Therefore, prioritizing the comprehensive exploration of cultural features serving as inspiration is imperative, and the experimentation process prove to be highly beneficial in fostering the creation of cultural products.

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