

# THE HISTORICAL TIMELINE OF NIAS WAR ARMOR MATERIALS DEVELOPMENT AND TECHNOLOGY

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**Abstract:** *This study aims to unravel the relationship between technological developments, material aspects, and historical events in the form of clothing material's function in Nias war armor. The warlike culture of the Nias people has historically emphasized the importance of war costume and weaponry. The raw material, external influences, and technology is evident in Nias war armor reflect the development of civilization on the island. Data collection was carried out by literature review, interview, field observation, and descriptive analysis. This study observes that Nias war armor was made from natural materials such as Oholu tree bark, palm fibers, pandanus leaves, animal skin, iron, and tin. The use of material in Nias armor is highly adaptive, addressing the soldiers' needs for protection, resistance, comfort, and self-expression. This study also provides new insights into the adaptability of Nias war armor throughout history.*

**Keywords:** *historical timeline; material; Nias war costume.*

## 1 INTRODUCTION

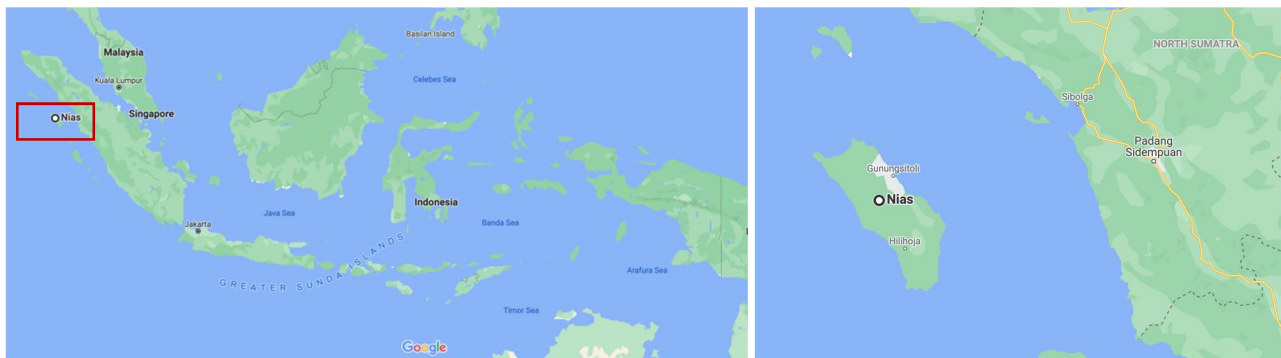
This research addresses the question of how the material of Nias war armor developed over time through analysis of raw material, external influences, and technology. Nias war armor was used as a protective gear, however, today, the Nias war armor is used as a costume for welcoming tourist. The diversity of material used in Nias war armor lends particular interest to its historical timeline that has yet been discovered. Through the examination of Nias war armor, this study aims to unravel the relationship between technological developments, material aspects, and historical events in the form of clothing material's function.

Clothing reflects the culture and characteristics of a civilization. The emergence of new ways of dressing can mark a turning point in a culture's history by introducing new values to the social structure [1]. Clothing is a response to political, economic, artistic, and war conditions. Analyzing the historical development of clothing can reveal the circumstances that a society experienced. Clothing is a product of user-oriented development. The objective of a garment can be divided into practical and symbolic values. In the case of war clothing, the material serves a pragmatic purpose: to provide optimal protection and agility in combat [2]. Based on its material, war clothing can also show a function of symbolic value based on the traditional beliefs of a region.

Indonesia expressed its regional cultural values through traditional clothing. The significance of traditional clothing is tied to the cultural values

embedded within it. These values are related to economic, social, and political aspects of life which have been translated into visual structures, materials, colors, and patterns.

Nias, a remote island located west of Sumatra, Indonesia (see Figure 1), is often forgotten; therefore, its civilization has developed in relative isolation from other parts of Indonesia. Over time, Nias became known as a warlike society that prioritized innovation in armor and weaponry [3]. The evolution of Nias war costume is evident in its varied material and technology. It is crucial to understand the history, purpose, and technology of traditional war clothing to recreate its design. Due to its isolation, Nias offers an interesting contribution to the discussion of cultural development through clothing. During the colonial period of Indonesia, Nias was not a prime area of interest for the Dutch colonists because it lacked spices. Historically, Nias has never enjoyed a high profile in the cultural, political, or economic realms of Indonesia. Moreover, Nias did not play a role in the history of the great kingdoms that once ruled the archipelago, namely the Sriwijaya Kingdom (in power from the seventh to the eleventh century) and the Majapahit Kingdom (in power from the thirteenth to the fourteenth century) [4]. At that time, Nias was described as an independent island by Arabic, Chinese, and Indian merchants [5]. The people of Nias have been isolated and often forgotten by the Indonesian central government due to their remote location [6]. However, this environment is ideal for performing a case study of Indonesian culture.



**Figure 1** Map showing the location of Nias Island within Indonesia. Courtesy of Google Maps

Today, Nias remains an independent society that still practices megalithic traditions and creates stone crafts, wood carvings, and earthquake-resistant architecture. This expertise is a valuable asset to Indonesian culture. Therefore, documentation and analysis are necessary to highlight the importance of addressing social changes in Nias in order to preserve its culture and facilitate its continued progression.

Nias culture was built on a unique community system of war society and social hierarchy. Clans and families in Nias were separated based on distinct social classes: (1) *si'ulu*, meaning "those who are on high", namely the highest customary leaders or aristocrats who descended from the village founders; (2) *si'la* ('he who knows'), the chief's advisors; (3) *ere*, or religious leaders; (4) *sato*, which means village children, or ordinary people; (5) *sawuyu*, the slaves who previously belonged to the aristocracy and lived outside the village [6-8].

War is a tactic typically employed to expand territory, property, and dignity. War in Nias was motivated not only by political or group factors, but also by the personal conflicts of the villagers [6]. In the Nias language, the concept of *éfavanusa ndröra banuas* states that patriotic feelings of the village are more important than kinship relations. As a result, the villagers would fight to defend their village's honor. War was a constant presence in the daily life of the people of Nias. Therefore, the creation and innovation of weaponry and armor took priority over that of agricultural equipment. The abundant evidence of armor and weapons of war in Nias confirms that the development of war equipment was always prioritized. The war clothes demonstrated the pride of the soldiers, which is evident from the quality of the materials and the detailed decoration in the clothes. The society adapts and develops material and technology in making cloths for armor throughout history. It is evident that developments material and technology of Nias war armor through historical approach is suitable but the relevant data on this topic is limited.

Through further analysis of Nias war armor, the response of the Nias people to their environment can be revealed.

## 2 RESEARCH METHOD

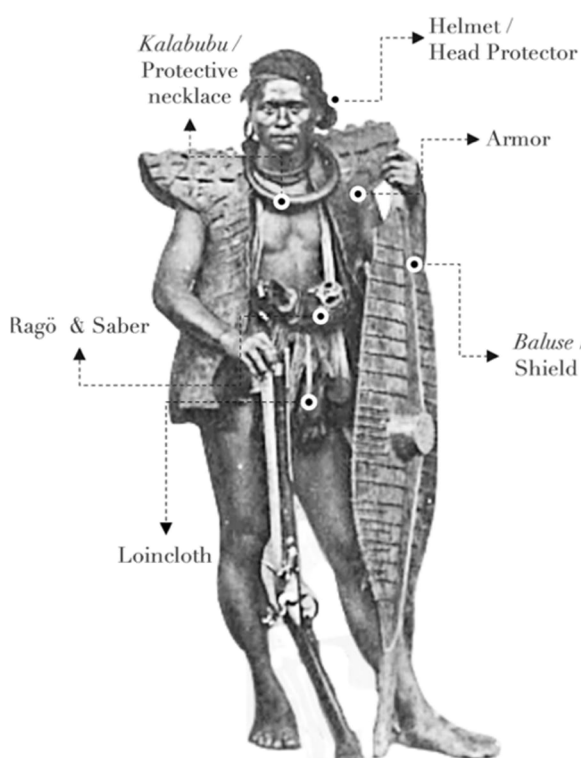
This qualitative research aims to construct a timeline of material usage in Nias war armor through analysis of raw materials, external influences, and technology. The primary data have been collected from the online archives of the Nationaal Museum van Wereldculturen, a comprehensive museum organization for the management of several ethnographic museums in the Netherlands, founded in 2014 that consists of the Tropenmuseum in Amsterdam, the Museum of Africa in Berg en Dal, and the Volkenkunde Museum in Leiden (<https://collectie.wereldculturen.nl/>); the database was searched using the keyword "Nias" and filtered by column (objects) and category (battle and war). Data was also gathered from the online archives of the Musée du Quai Branly – Jacques Chirac, Paris (<https://www.quaibranly.fr/en/explore-collections/>) using the keyword "Nias." The collected data regarding Nias armor material, history, and artifacts are primarily based on field research at Nias in 22 to 24<sup>th</sup> of August 2019 in the Nias Heritage Museum and Bawomataluo Village's. Data collected in the Nias Heritage Museum are capturing object images related to Nias war equipment and in-depth interview with Nata'aluhi Duha, director of the Nias Heritage Museum. This paper also interviews Daliziöhi Manaö, grandson of the Bawomataluo Village's warlord regarding Nias warlike culture and oral history of warriors and war implements. The secondary data were obtained through books, journals, and proceedings related to the present topic. Data collected from primary sources are compared also cross-checked with the secondary sources and discussed in this article.

### 3 RESULTS

#### 3.1 Nias war armor: basic structure and function

The villages in the Nias area were considered one clan. Members of one large village could separate and construct a new village due to differences in principles or opinions with the village leader. Wars between the newly separated villages were a common occurrence. When fighting at night, the similar appearance of the opponent's war clothing would confuse both parties. To differentiate between groups, a village war unit would create a special sign recognizable only to soldiers from that village [9].

Traditional Nias war clothing was composed of five pieces of protection: the helmet or head protector; *kalabubu*, the protective necklace; armor; loincloth; and *baluse*, the shield. Weapons of the Nias warriors included the saber (with *ragö*, a rattan ball used to store amulets) and the rifle, which the Nias stole from the Dutch army (see Figure 2). Psychologically, this structure made the soldier's body appear more substantial and intimidating to his opponent [10]. This basic structure was worn by soldiers and nobles alike; the warrior's status was differentiated by a circular detail on the back of the neck, which offered extra protection (see Figure 3).



**Figure 2** Basic structure of Nias armor. The basic structure consists of defensive tools: *kalabubu*, the protective necklace; armor; loincloth to protect vital body part; and *baluse*, the shield.; and attacking tools: sabres, and gun. This structure is seen on all Nias war armors (Collection Nationaal Museum van Wereldculturen. Coll.no. RV-A72-133, adapted by researcher)



**Figure 3** The basic structure of the Nias war armor (flat sketch). It has a front opening, an A-line silhouette, a large shoulder section, and a circle detail on the neck. To differentiate the war armor and noble's vest is the circle detail on the neck. This detail gives a double protection for the warrior's neck alongside the *kalabubu* necklace

The Nias people recognized two types of war: *sifalau* and *sifatele*. In the case of *sifalau*, the enemy was attacked by surprise, while in *sifatele*, the war was prearranged. The significance of Nias war armor was evident during negotiations, encouragement before fighting, and battle. Before officially declaring war, the opposing parties would conduct negotiations to determine whether either side would concede defeat [8 - p. 457, 9]. In these meetings, the soldier, in all the splendor of his armor, would be seen by his opponent. Due to psychological influence, even a group with a tactical advantage could feel intimidated by its opponent (psywar) [10]. If an agreement could not be reached, and war was declared (*sifatele*), the soldiers would gather to engage in morale-boosting rituals. Warlords and soldiers would shout, perform *hoho* (an oral tradition in the form of verse), and stomp their feet. These pre-battle rituals stimulated the soldiers' adrenaline and fostered a sense of group solidarity. Today, the Nias people reenact this tradition in the form of war dance to commemorate the greatness of their ancestral soldiers [11]. Before battle, war armor would be stripped of its decoration. The material of the armor provided the warrior with a form of defense, while its decoration offered him a means of self-expression. Nias war armor conveyed the identity of the wearer as an individual as well as his belonging to a group.

It can be concluded that Nias war armor served both external and internal functions. Externally, war armor could intimidate the soldier's opponent and offer protection for members of his village. Internally, war armor could bolster a soldier's self-confidence, foster a sense of belonging in a group, and display the wearer's creativity and craftsmanship.

#### 3.2 Developments in materials and technology used in Nias war armor

Nias war armor has undergone several stages of material and technological development. The timeline of Nias war armor can be divided into



three stages: traditional materials and technology, foreign materials and technology. and a combination of traditional and foreign materials and technology. The technology for making war armor also developed alongside the materials used. In Nias language, armor that resembled a shirt was called *baru* (shirt), while more substantial armor was called *öröba*

(armor). The Nias named war armor based on its material. This research mentions *baru oholu*, created from the Oholu tree; *baru leama*, braided from *leama* (palm fiber); *baru sinali*, weaved with *sinali* fiber (pandanus fiber), *öröba uli mbuaya*, created from *buaya* skin (crocodile skin); and *baru öröba*, known as the armor shirt (can be seen in Table 1).

**Table 1** Analysis of the development of Nias war armors by year, name, material, phenomena and influence, technology, material characteristics, image, and function

Year	Name	Phenomena & influence	Material	Technology	Material characteristics	Image	Function
12.000 BC	<i>Baru Oholu</i>	Simple techniques to protect the body, Hòa Bình and Toala cultural influences	Oholu tree bark	beating with a rock	thin, light		protection
5.000-4.000 BC	<i>Baru Leama</i>	The Austronesian race from Taiwan via the Philippines	palm fibres	braiding	thick, coarse, heavy		resistance
500-100 BC	<i>Baru Sinali</i>	Dong Son culture	pandanus fiber	weaving	soft, light, breathable		comfort
100 BC - 851 AD	<i>Öroba uli mbuaya</i>	Develops the pattern of weaving techniques on animal skin materials	animal skin	cutting, smoking, combining with <i>ösumö</i> technique	thick, strong		resistance
	<i>Baru Öröba</i>	Lack of crocodile skin material. Introduced new materials from Chinese, Arab, and Indian traders. Ability to form materials into specific shapes	iron	forging, smoking	strong		resistance, self-expression
1894	<i>Baru</i>	Using a combination of local materials	bark, rattan, palm fiber	beating with a rock, weaving, and combining	thick, breathable		resistance, comfort, self-expression
1930	<i>Baru Öröba</i>	Incorporating several materials and decorations	crocodile skin, iron, rope, and yellow paint	forging, smoking, painting	thick, strong		resistance, self-expression



Year	Name	Phenomena & influence	Material	Technology	Material characteristics	Image	Function
1960	<i>Baru Öröba</i>	Using local materials with a combination of other materials.	tin	forging, smoking, sewing	strong, thin		protection, self-expression
2019	<i>Baru</i>	Using foreign materials with decorative patterns	cotton, yarn	sewing, embroidery	light, soft, breathable		resistance, self-expression

### 3.2.1 Traditional materials and technologies

The first excavations undertaken by the Nias Heritage Museum and Airlangga University found that the inhabitants of Nias Island first occupied the Tögi Ndrawa cave around 12,000 years ago. This conclusion was reached through research on the skeletal remains of vertebrates, as well as Paleolithic tools, such as stone flakes and arrowheads. The most compelling evidence of civilization included the discovery of an oval andesite stone with a character resembling a bat, a hammer, and a tool made from horns and mollusk shells (see Figure 4). Cultural similarities exist between the early Nias and the people of the Hòa Bình culture from Southern China and Vietnam, as well as the Toala culture from Sulawesi [12-14], in [15] argued that "bark cloth technology originated in the Huang and Huai Plains of North China, passed through the valleys of the Yangzi and Han rivers to south China, and then on to the islands of Taiwan and Hainan before moving onto Indonesia, via Vietnam." This finding aligns with the emergence of the Nias bark shirt.



**Figure 4** Paleolithic tools found at Tögi Ndrawa cave: oval andesite stone with a character as a bat, a hammer, and a tool or spatula made from horns and mollusk shells (Courtesy of Nias Heritage Museum)

The Nias tribe used the bark of the Oholu tree to create barkcloth. Barkcloth was made by carefully peeling the Oholu bark to obtain a piece approximately 130-150 cm long and 40-50 cm wide. The peeled bark was then soaked in water for a few hours to make it malleable. The process of beating (*lalabago*) the bark peel with stone would make it wider, thinner, and more pliable [16, 17] (see Figure 5). Once dried, the bark peel would be sewn together into garments called *baru oholu* (see Figure 6). The manufacturing and maintenance process of barkcloth clothing was a time-consuming endeavor. This barkcloth was used as a body covering to protect the warrior from the island's climate. This is also in line with first and superior function of clothing as a protection of the human body injury of the skin [18]. In conclusion, the barkcloth armor's primary function was protection.

In [19] is presented DNA evidence that the first Nias people originated from Taiwan and accessed Nias Island via the Philippines. According to oral tradition, all knowledge and expertise were handed down by *Hia Walani Adu*, the most prominent figure in early Nias history. He passed on the rules of life in Nias culture, including customs, religion, agriculture, carpentry, and crafts. These settlers are estimated to have entered Nias around 5,000-4,000 BC, bringing progress in various fields, including weaving, carpentry, and metalwork [12, 20]. Like *baru Oholu*, *baru leama* used local materials sourced from nature. Palm fiber from the palm tree (*leama*) is a hard and coarse material. Therefore, it is rigid, uncomfortable, and heavy in its natural state [17]. However, the braiding technique employed by the Nias made the material easier to fabricate into clothing than barkcloth. Moreover, it added volume and strength to the soldier's body, protecting him from injury. According to [18], the first category of function of clothing after protection is the utility performance (strength, etc.). This article concludes that the primary function of palm fiber armor was resistance.



**Figure 5** The process of recreating the barkcloth production. Peeling process of the bark of Oholu tree. This process is crucial since there should be no tear on while peeling. After soaking in the water, the peeled bark is hammered with a stone (Hòa Bình culture influence) (Documented by Nias Heritage Museum and Dina Waoma)



**Figure 6** The process of recreating the barkcloth. After cutting the bark according to the pattern, it is combined by sewing (modern technology) (Documented by Dina Waoma)

Heine-Geldern [21] stated that the late Bronze-Age Dong-Son in circa 500 BC and 100 BC, distributed weaving to Indonesian archipelago [22]. As the Niasan learned the weaving techniques of Dong-Son culture, their war armor pattern pieces became more refined and better structured. The double braiding technique was performed by hand to unite the patterns, improving the basic shape of the Nias armor. The woven material was made of pandanus leaves formed into a small and fine rope (*sinali*). Based on its material, this armor is called *baru sinali*. The transition from palm fiber material to lightweight pandanus leaf material facilitated soldiers' movements during battle, allowing them to jump and run effortlessly. Although *baru sinali* was thinner than *baru leama*, this new armor improved the soldier's agility and confidence in battle. The second category of function of clothing after protection and utility performance is comfort performance (fitting to the human body) [18]. The primary function of this material can thus be considered comfort.

Previously, the Nias used *baru* (shirt), as the term for the armor. Upon the replacement of plant materials with animal skins, Nias war armor was officially

declared an "armor," or *öröba*. During this period, Nias war armor gained popularity. Animal skins were sourced from the tiger, the buffalo, the pangolin, and, most famously, the crocodile.

Crocodiles occupy the rivers of Nias and are traditionally associated with the underworld (hell), or with punishment from ancestors [20]. Crocodiles are seen as elegant killers – they do not rush during a hunt, but rather monitor their prey in silence. Crafting *öröba uli mbuaya*, or crocodile skin armor, is a unique traditional Nias technique. The dorsal surface of the crocodile is protected by a natural armor of osteoderms, which are individual segments made of a porous bony core surrounded by dense bone. As a result, crocodile skin is flexible yet puncture-resistant [23]. The people of Nias modified the crocodile skin, fortifying its natural hardness to withstand enemy attack. To create this armor, the Nias cut the crocodile skin into eleven pieces, much like a clothing pattern, which were then joined using the *ösumö* technique [24]. The distinctive feature of this armor was the prominent display of the crocodile's dorsal skin on the armor's back. This skin piece was the largest of the eleven pieces of leather. Two large pieces of crocodile skin were

positioned to cover the chest to the waist, while two curved pieces provided shoulder protection. Pairs of crocodile hands and feet covered the armor, starting from the sides of the body and ascending to the armpits and the back of the neck [24]. Based on the material characteristics of the crocodile skin, the function of this armor was resistance.

Analysis of armor made with local materials and technology reveals the use of materials native to Nias nature and techniques passed down by Nias ancestors, as well as those adapted from foreign traders. Recorded materials and techniques used for making clothes during this period include barkcloth, made from hitting the bark of the Oholu tree with a stone; palm fiber, which was joined into a rope and then braided; woven pandanus fibers; and crocodile skin cut into patterns and combined with the *ösumö* technique. Nias war armor was initially manufactured for protection, comfort, and resistance.

### 3.2.2 Foreign materials and technology

The Nias soldiers' affinity for wearing crocodile skin caused the crocodile population to decline. As their source of armor material grew scarce, the Nias soldiers chose to move on to iron. Iron ore is estimated to have entered the island before the 851 AD. Iron ore is a material imported by traders and sailors from Arabia, China, and Indian, according to early notes from Sulayman and the "*Kitab adhaib al-Hind*" from India written in 950 [12]. Nias also bought brass and gold plates in exchange for skulls acquired from headhunting [5]. malleability allowed it to be shaped and hammered according to the desires of the soldiers [20]. The texture, shape, and detail of this novel metal armor were typically designed to imitate the texture of crocodile skin. However, the level of customization and detail possible with this armor offered the soldier the chance to reach self-expression, or the validation of self-esteem and craftsmanship in his creation. In Nias culture, the color black symbolizes the anger and ferocity of soldiers during battle. Therefore, before use, the armor would be hung from the second floor of the soldier's house and smoked until it reached a black color like crocodile skin armor [20]. The primary functions of this armor were resistance and self-expression.

Iron war armor was created due to the scarcity of crocodile skin, as well as the entry of new technology from trading with Arabia, China, and Indian merchants. The purpose of producing war armor with this material was to facilitate resistance and encourage the self-expression of soldiers.

### 3.2.3 Combination of local and foreign materials and technologies

In later years, Nias war armor was characterized by the combination of various techniques and decorations by the soldiers. Generations of experience taught Nias warriors to extract the best

attributes from a variety of materials and techniques. Examples of late Nias war armor are documented in the archives of the Nationaal Museum van Wereldculturen in the Netherlands and the Musée du Quai Branly – Jacques Chirac in France.

In 1894, the Nationaal Museum van Wereldculturen (Coll. No. RV-985-1) acquired war armor made from a combination of bark, rattan, and palm fiber [25]. Nias warriors combined the best characteristics of each local material to create a sturdy, yet comfortable armor. The combination of materials emphasizes the basic structure while showing the creativity of the warrior. The barkcloth serves as the base of the armor, while the outer layer is constructed of woven fibers joined together with rattan stitches. This makes the war armor stronger and more comfortable, with a fierce appearance. The functions of this armor included resistance, comfort, and self-expression.

Circa 1900, Musée du Quai Branly – Jacques Chirac (Coll. No. 71.1912.3.237) documented war armor made from coconut fiber. The armor was constructed with a rattan frame built over a base of barkcloth. Palm fiber was tied to the rattan frame layer by layer. Trims of rattan rings adorned the armholes, hem, front, and neckline. At the back of the armor, the addition of four palm fiber "ponytails" was added. This armor displays the functions of resistance, comfort, and self-expression.

In 1930, the Nationaal Museum van Wereldculturen (Coll. No. TM-6402-1a) received a Nias war armor made from a mixture of crocodile skin, pangolin skin, and forged iron decorated with yellow paint to imitate gold. Yellow in Nias culture signified nobility and wealth [20]. The armor conveyed strength and displayed the warrior's creative design. The combination of animal skin and iron created a shield for the warrior's body, while the yellow accent color signified the victory of the warrior. This armor's functions included resistance and self-expression.

In 1960, the Nationaal Museum van Wereldculturen (Coll. No. TM-2918-25a) received another piece of Nias armor made from tin with decorative application mimicking the style of *baru oholu*. Like iron, tin was imported to Nias by traders and sailors. The tin plates were combined with traditional sewing methods to create a unique asymmetrical design. The armor's main functions were protection and self-expression.

It should be noted that the years referred to above are not the years in which the decoration, techniques, or materials were first formed. However, these findings indicate that one village could apply different materials to the same basic structure.

Today, Nias war armor is used as a performance costume intended to drive away malevolent spirits. These costumes are worn to escort respectable guests to meet the village chief, to perform dances



celebrating significant life events, and to attend major ceremonies [20]. This modern form of “war” armor is constructed of cotton with embroidered decorations. It no longer serves the purpose of protection, but now facilitates comfort and self-expression.

The conclusion gathered through analysis of combined materials and technology in Nias war armor reveals the ability of the Nias people to see the advantages of each material's properties. Increased knowledge, expertise, and technology allowed Nias war armor to reflect the individuality of the Nias soldier. The Nias' experiences in making armor taught them that in order to achieve their goals of increasing resistance, comfort, and self-expression, a combination of local and foreign materials was the best method. In this period, decorations were emphasized to show the character of the soldier (see Figures 7 and 8). The techniques of weaving, painting, embroidering, forging textures, and even decorating with gold were employed to achieve this goal.



**Figure 7** A group of soldiers and nobles of Nias in their armor in 1915. Seen in the picture that the group has similar armor structure. The differentiation of the group's status is seen through the armor's material and decoration (Photograph and courtesy of Feldman et al. 1990:111)



**Figure 8** Three Nias soldiers with different war armor materials during the same period. Although there is a timeline on Nias war armor's material, the warrior has their own decision on choosing the material and decoration (Collection Nationaal Museum van Wereldculturen. Coll. No. TM-10001506)

## 4 DISCUSSION

The main finding of this study is that the material development of Nias war armor exhibits the adaptive nature of the Nias people. Close observation reveals the connection between Nias historical events, artifacts, and the development of Nias war armor. According to [26], material has consolidated humanity's need either to be protected from the environment (protective function), or desire to outwardly convey a message about themselves (self-expression). It is evident that over time, Nias war armor's material progressed from local materials, such as the Oholu tree bark, palm fibers, pandanus leaves, and animal skin; foreign materials, such as iron and tin; and a combination of local and foreign materials. The chief functions of materials in Nias war armor were protection, resistance, comfort, and self-expression. These functions are in line with the concept of fabric function as clothing material according to [18], protection, utility performance, and comfort performance. The study of clothing can provide insight into the evolution of civilization. Clothing provides vital evidence to help us understand what occurred in the past and how this has affected the present. Similar study has been done by [27] with the development of Chinese clothing function that lies between protective function, beauty, and religion. Each of these changes are the result of interactive influence between the outside world and China's own dynastic tradition [27]. It is evident that the development of Nias war clothing was closely tied to historical phenomena in Nias; the most obvious proof is the correlation between Hòa Bình and Toala cultural influences and material developments in Nias armor in 12.000 BC with evidence of stone hammer founded in Tögi Ndrawa cave. This can also be seen in the arrival of settlers from Taiwan via the Philippines in 5.000-4.000 BC with evidence of the research of Nias DNA that was highly related with the Philippines and Taiwan descendants with braiding fabrication. The Dong-sou culture migrating to Indonesia during 500-100 BC influenced the weaving technique with local material. Local technique of creating crocodile skin into armor with *ösumö* technique is one of the innovations of Nias culture. Evidence of iron trading was mentioned in 851 AD with Arabia, China, and Indian merchants. These historical events impacted the development of material and functionality in Nias war armor.

This research supports the idea that Nias warriors emphasized the importance of manufacturing war equipment by [3]. Therefore, the progression of material and technology was essential to create innovative war costumes. From armor artifacts, it is apparent that Nias warriors combined the best characteristics of both local and foreign materials to create armor that provided protection and facilitated self-expression.



This analysis provides new insight into the rich history of Indonesian traditional clothing, much of which has not yet been researched. Culture naturally evolves over time. As the creative work of the Indonesian people flourishes, Indonesian culture will continue to develop new values. This study of material and technology in Nias war armor can be applied to various other disciplines. Today, the people of Nias no longer use war armor for defensive purposes, but rather as a dance costume. This creates an opportunity for costume designers to adapt the Nias war armor into a decorative and theatrical structure.

This study encourages further research and development using contemporary technology and materials. For example, 3D printing techniques using plastic material could allow designers to create armor digitally and quickly. "Dry-fit" sportswear technology is another modern material that can be applied to improve the comfort of traditional Nias clothing. A hands-on research approach might involve creating a modern fashion collection based on the traditional structures, materials, and technology of Nias war armor, which could then be appreciated by the wider community.

## 5 CONCLUSION

This study investigated the relationship between Nias war armor and historical events. Detailed analysis established the chronological timeline of Nias war armor and revealed its relationship with historical events, materials, and technologies.

Traditional clothing offers valuable insight into the development of a civilization. Analyzing the timeline of traditional clothing can link historical events and technological developments with changes in local traditions. Clothing is a basic human need, but its function can shift from a purely utilitarian role to become a means of self-expression. Analysis suggests that the timeline of Nias war armor was defined by an early period of local materials (circa 12.000 BC until 851 AD), an interim period of foreign materials (circa 100-851 AD), and finally a combination of both local and foreign materials (circa 1894 AD). Each material has its own distinct function. These conclusions were reached by examining local myths and history. Through this analysis, it is clear that the adaptable nature of the Nias people will allow them to continue to adapt to the modern world.

The many forms of Nias war clothing are a testament to the Nias culture's ability to adapt to changing science and technology. The development of materials in Nias armor was marked by the shift from local materials to foreign materials, and finally the mixing of the two materials to create a more advanced form of armor. This article shows the Nias' usage of barkcloth, palm fiber, pandanus leaves, animal skin, and iron. The development of materials

was accompanied by technological discoveries of how to process these materials: the technology of beating bark into cloth with stones, braiding, weaving, smoking, *ösumö*, forging, sewing, and embroidery. This research concludes that Nias war costumes, particularly those based on materials and technology, were adaptive and demonstrated functions of protection, resistance, comfort, and self-expression. Current study can contribute to uncovering the relationship between history, material, and technology in Indonesian traditional clothing as well as further research and development using contemporary technology and materials.

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