JSW JURNAL SOSIOLOGI WALISONGO

JSW (Jurnal Sosiologi Walisongo) – Vol 8, No 2 (2024), 181–196
ISSN 2503-3166 (print); ISSN 2503-3182 (online)
DOI: 10.21580/jsw.2024.8.2.10486

Bale Balaq: A Local Wisdom-based Construction with Earthquake Resistance in North Lombok, West Nusa Tenggara, Indonesia

Peri Anggraeni,[1] Syarifuddin Syarifuddin,[1] Oryza Pneumatica Inderasari[1*]

[1]Department of Sociology, Faculty of Law, Social and Political Sciences, Universitas Mataram, Mataram – Indonesia

Abstract

Bale Balaq is a traditional house construction built based on the local wisdom of the Sasak tribe. The Malaka village community is one of the Sasak tribe communities that still use *Bale Balaq* as their residential dwelling. This study uses a qualitative, phenomenological approach. The findings describe that the design of the *Bale Balaq* building is based on local wisdom, including the materials used in its construction, such as wood, thatch, *bobok* (coconut leaves), and bamboo, as well as the rules governing the construction of *Bale Balaq*. *Bale Balaq* is not just a place to live; each structure within *Bale Balaq* holds philosophical values that serve as a way of life. *Bale Balaq* is interpreted as a character that reflects identity, provides safety for those living within it, and offers comfort to its inhabitants. Moreover, Bale *Balaq* is resistant to disasters such as earthquakes.

Bale Balaq merupakan konstruksi bangunan rumah tradisional yang dibangun berlandaskan kearifan lokal Suku Sasak. Masyarakat Desa Malaka merupakan salah satu Masyarakat Suku Sasak yang masih menggunakan bale *Balaq* sebagai hunian tempat tinggal. Penelitian ini menggunakan kualitatif, pendekatan fenomenologi. Hasil temuan menggambarkan bahwa desain bangunan dari *Bale Balaq* dibangun berlandaskan kearifan lokal, termasuk dari material pembuatannya menggunakan kayu, ilalang, bobok (daun kelapa) dan bambu serta aturan-aturan dalam pembuatan *Bale Balaq*. *Bale Balaq* bukan hanya sekedar tempat tinggal, melainkan dari setiap bentuk bangunan yang tersusun dalam *Bale Balaq* memiliki nilai-nilai filosofi yang dijadikan sebagai pandangan hidup. *Bale Balaq* dimaknai sebagai suatu karakter yang menggambarkan jati diri, memberikan keamanaan untuk orang-orang yang tinggal didalamnya dan dapat memberikan kenyamanan bagi penghuni yang tinggal di dalamnya. Selain itu, *Bale Balaq* memiliki ketahanan terhadap bencana seperti gempa bumi.

Keywords: *Bale Balaq*; earthquake resistant; local wisdom; Malaka Village; social construction

[*]**Corresponding Author:** Oryza Pneumatica Inderasari (oryza.sociologist@unram.ac.id), Faculty of Law, Social Sciences and Politics, Universitas Mataram, Jl. Majapahit No. 62 Selaparang, Mataram, Nusa Tenggara Barat 83126, Indonesia.

Submitted: 15 Jan 2022; Received in revised form: 30 May 2024; Accepted: 11 Aug 2024; Published: 31 Oct 2024

Introduction

Bale Balaq, a traditional building construction of the Sasak Tribe, has a speciality because it is resistant to the natural phenomenon of earthquakes (Abidin 2023). The starting point of the author's attention departs from the earthquake experienced by the people on Lombok Island in 2018. This event is not the first time because historical records document that major earthquakes have caused natural disasters since 1856, 1970, 1972, 1978, 1979, 2000, 2016 and most recently, in 2018 (Zulfakriza 2018). Earthquakes on Lombok Island occur repeatedly because of its position in an active tectonic area between two large tectonic plates, namely the Eurasian Plate and the Australian Plate, making Lombok Island prone to earthquakes and even tsunamis (Agustawijaya and Syamsuddin 2009).

The impact of damage and losses caused by the natural phenomenon of the Lombok earthquake in 2018 in various sectors reached 5.04 trillion rupiah. The details come from the settlement sector, 3.82 trillion rupiahs, infrastructure, 7.5 billion rupiahs, productive economy, 432.7 billion rupiahs, socio-cultural, 716.5 billion rupiahs and cross-sector, 61.9 rupiahs (Hadi). The settlement sector is one of the sectors that suffered severe damage. It can be seen from the details of 125,744 damaged houses, 789 places of worship, 635 damaged schools, 99 damaged health facilities, and 18 damaged bridges (Wismabrata and Damanik 2018). The community settlements that experienced damage or destruction used the primary raw material of brick material and modern architecture.

Meanwhile, community dwellings built using wooden materials with traditional architecture still survived, and no damage occurred due to the earthquake. The community's knowledge of building dwellings with wood is based on considerations of the availability of natural materials around the environment, natural conditions, and the tropical climate on Lombok Island. This building is called *Bale Balaq* by the people on Lombok Island (who are from the Sasak tribe). The construction of the *Bale Balaq* also follows traditional Sasak architectural principles that have been used for centuries (Nukman 2018).

Many studies have related to architectural resilience in the face of natural disasters, such as during the earthquake in Padang in October 2009, Bengkulu in September 2007, Yogya in May 2006, and Nias in March 2005. These events caused many modern brick construction buildings to collapse (Lumantarna et al. 2017).

Not only that, traditional buildings in the Sumatra region have adapted for centuries to cope with earthquake hazards through the existence of traditional houses that are technically safe from earthquake hazards (Bahri and Kamil 2023; Setyahadi et al. 2019).

A study conducted during the Sumatra-Andaman earthquake showed that houses built using wooden frames experienced less collapse and damage than bricks (Pribadi et al. 2021). They were reinforced by research conducted by Raihan, 2020. The research tries to modify the architecture of earthquake-resistant buildings with the Healthy Simple Instant House Technology (RISHA - *Rumah Instan Sederhana Sehat*). However, it maintains the values of the stilt house as a residence based on the local wisdom of the people of South Sumatra. This RISHA technology has been used as a technology for rehabilitation and reconstruction in Nanggroe Aceh Darussalam, Nias, West Java, Riau Islands, West Sumatra, Bengkulu, Lampung, Bangka Belitung, Jambi, Yogyakarta, Central Java, Bali, East Nusa Tenggara, and West

Nusa Tenggara (Raihan, Siswanto, and Teddy 2020).

These earthquake-resistant community houses are built based on local wisdom with traditional architectural designs equipped with philosophical values in a complex super-structure and structure. YB Mangun Wijaya stated that the scope of architectural problems is 80% related to social problems and only 20% related to technical or technological aspects. It has been supported from the beginning of human history until now, showing that human habitation or settlement reflects the value system adopted by humans, including norms, culture, economy, and other non-physical aspects. As part of the physical form of culture, architecture is an inseparable part of two other forms of culture: the form of the system of ideas (values) and the form of the social system activities (Arsyad 2010).

Bale Balaq, as shown in Figure 1, holds significant cultural value for the Sasak people on Lombok Island. The Sasak people consider the term *Bale Balaq* as a traditional house building that can save its inhabitants from disaster. It was reflected during the natural disaster of the earthquake in 2018; the condition of *Bale Balaq* was still standing upright and did not collapse. Meanwhile, the earthquake damaged and destroyed community houses built using modern architecture. These settlements were damaged, and some were flattened to the ground due to the earthquake. The event caused great fear for the affected community and resonated in the community's collective memory (Krüger et al. 2015). It also had an impact on many people who were hit by buildings, suffered injuries, and even died as a result of being hit by the rubble of houses and buildings. Another consequence was that they had to stay in emergency tents long. Even people living in evacuation areas were also hit by drought due to the earthquake tremors. These conditions are very vulnerable to diarrhea, itching, illness due to poor sanitation, etc. (Savitri 2018).

Figure 1
Bale Balaq, Traditional Houses of Sasak Tribe

Souce: Personal Document.

This phenomenon compares building resistance to earthquakes in traditional and modern buildings that are commonly used in residential areas. Where traditional buildings have construction in line with disaster experience and show the importance of local knowledge (Kusumasari and Alam 2012).

How local knowledge transforms into learning has led to increased scientific research and relief practices related to critiquing pre-existing hazards (Krüger et al. 2015; Pelling 2007; Weichselgartner and Pigeon 2015). It suggests that indigenous knowledge is becoming a significant factor in disaster reduction (DRR) efforts which have been recognized in many recent cases and studies around the world (Fayazi, Bisson, and Nicholas 2020; Hiwasaki et al. 2014; Wang et al. 2019).

The local knowledge of the Sasak community regarding the utilization of residential buildings with earthquake mitigation functions has been an important factor in saving lives in Indonesia in the past and recently (Fahriza et al. 2022). Knowledge of utilizing natural materials with values passed down from generation to generation by ancestors is then adjusted to a region or community in a distinctive and unique form. The creation of cultural products, one of which is a residence in the form of Bale Balaq, goes through a process of adaptation and interpretation of knowledge received from generation to generation by the local community, so that it becomes wisdom inherent in their culture and traditions.

While the demands of modern life place humans to be able to adapt to technological developments as well as changes in lifestyle and human needs, including the desire to build a house with modern architecture, often the construction of modern buildings ignores challenges and risks, such as effects on the environment, safety issues, and lack of compatibility with local conditions and culture. Before deciding on a building design, several factors will be taken into consideration. It is also about taste and budget capabilities. When budgets are limited, but modern buildings are desired, the consequence is a reduction in the quantity and quality of building materials. On the other hand, people who still maintain traditional designs will reduce construction costs by utilizing materials available from nature.

Considerations for deciding on building design options will undoubtedly affect community preparedness for potential disasters that may recur. Disaster mitigation can be done by exploring local knowledge about *Bale Balaq*; although it is categorized as traditional, the principles of earthquake-resistant construction can be used as a reference for rearranging the construction of residential buildings, even modifying modern buildings that use the principles of local wisdom.

Considerations for deciding on building design options will undoubtedly affect community preparedness for potential disasters that may recur. Disaster mitigation can be done by exploring local knowledge about *Bale Balaq*, even though it is included in the traditional category, the principles of earthquake-resistant construction can be used as a reference for the rearrangement of residential development, even modification of modern buildings that use the principles of local wisdom. It is attractive for researchers to focus on Sasak people who live in *Bale Balaq*, which is located in a village where the community still uses a lot of *Bale Balaq* buildings for residences, namely in Malaka Village, Pemenang District.

The study aims to explore the history of the existence of *Bale Balaq*, dig out the design and philosophical values of *Bale Balaq* construction, and the impact of using *Bale Balaq* in facing earthquakes.

The research used a qualitative method based on a phenomenological approach. The subjects in this study are individuals, consisting of three key informants and six supporting informants who are still using *Bale Balaq*. Data collection techniques were conducted through in-depth interviews, participatory observation, and documentation. Data collection was carried out from January 29 to March 17, 2020. The data analysis model used in this research is a qualitative analysis by following the concept provided by Miles, Huberman, and Johnny Saldana (2014) which consists of data reduction, data presentation, and conclusion drawing.

The History of *Bale Balaq* as Earthquake-resistant Local Wisdom

The existence of *Bale Balaq*, based on the results of the research that has been obtained, has existed since the time of the inscription and since the existence of Malaka Village. *Bale Balaq*, as local wisdom, takes the form of a residential building in Malaka Village. The building is believed to provide a sense of security for its inhabitants and is perceived to have resilience in the face of various disasters such as earthquakes. This research uses the ideas of Peter L. Berger and Thomas Luckman (1990) to understand how people build and construct *Bale Balaq* as an earthquake-resistant building. The social construction theory in Berger and Luckman's idea presupposes that the existence of *Bale Balaq* is the result of human construction, meaning that the use of *Bale Balaq* as a daily residential dwelling is not obtained from instinct. Instead, it is a social order formed through a dialectical process as a form of maintaining the existence of human existence. Berger also said that the social construction of *Bale Balaq* occurs when there is interaction between one another and is observed repeatedly related to a phenomenon that occurs every day, so from these observations, a social construction is formed (Sari and Prasetyo 2017). Peter L. Berger and Thomas Luckman (1990) suggested three social construction processes: externalization, objectivation, and internalization.

The process of externalization refers to how people put their ideas and notions into concrete form. Furthermore, *Bale Balaq* in social construction is a product of society formed by social interactions and behavior patterns. This product of society begins with pouring out or expressing oneself in various things. The outpouring of expressing oneself can simply be interpreted as releasing the content of ideas and ideas to give rise to an action that can be observed empirically (Sulaiman 2016). *Bale Balaq* was externalized by a royal dignitary who was exiled to Lombok Island during the inscription era, so since then, the existence of *Bale Balaq* has continued to survive and is used as a place for people to live in Malaka Village until now. Where the existence of *Bale Balaq* is externalized because it is based on several reasons, including:

Avoiding the Threat of Wild Beasts

Bale Balaq is externalized to save oneself from the threat of wild animals. This is because, in ancient times, Malaka Village was still surrounded by forests. As revealed by H. Akmaludin:

> "We are surrounded by forests, first the story is that everything here is in the forest, then in the forest there are many wild animals and so on, finally our parents produce their houses, yes, it is safer, it becomes a *Bale Balaq*" (interview, March 16, 2020).

The geographical conditions of Malaka Village, which is surrounded by forests, influence the residents to design stilt houses known as *Bale Balaq* to protect themselves from various threats, including wild animals. Similarly, the Momuna people, the indigenous tribe of Yahukimo in Papua Province, also choose to live in tree houses or elevated houses to safeguard themselves from threats such as wild animals, enemies, tribal wars, and supernatural beings. One of the factors driving this choice is the geographical condition of the Momuna tribe's territory, which consists of lowland forests (Maryone 2017).

Avoiding Puddles

Bale Balaq is internalized to avoid puddles when the rainy season comes due to the lack of river flow in Malaka Village. This is supported by the results of an interview with H. Akmaludin Ichwan, the head of Malaka Village:

> "The second is to avoid puddles during the rainy season because there was no irrigation, which is one of the reasons why our people make tall houses using *Bale Balaq"* (interview, March 16, 2020).

The process of externalization, according to Berger & Luckmann, in the existence of *Bale Balaq* is based on the need to avoid flooding, as irrigation systems were not yet available at that time. Similarly, the Malay community in Jambi has continued to use stilt houses from the Sultanate period until the post-independence era to protect themselves from frequent flooding in the Jambi Kota Seberang area, especially during the rainy season (Rahmaina et al., 2024).

Economic Limitations

The externalization process occurs due to economic limitations in obtaining materials such as cement and iron, which are more challenging to get than materials with wood materials. As the expression of the results of the interview with H. Salim as the community who lives in *Bale Balaq*:

> "There is no place to look for cement materials in the forest. I live in the forest because I have land. I use *Bale Balaq* to avoid ants, bereas, scorpions, snakes, pigs because these animals will not be able to climb up" (interview, February 14, 2020).

The use of *Bale Balaq* as a residential dwelling for the people of Malaka Village, from Berger's perspective, is closely linked to the process of externalization, where the community utilizes naturally available materials at that time. Additionally, they were not yet familiar with modern construction materials such as bricks or cement.

Bale Balaq Design as Earthquake-Resistant Local Wisdom

Bale Balaq is made using the primary material, namely wood, such as *ipil* wood, coconut wood, *kalimuru* wood, teak wood, mahogany wood, *kempas* wood, jot wood, and *lengkukun* wood. The wood used is a type of wood with good quality that is not readily eaten by termites and has a long durability. Furthermore, materials such as thatch and *bobok* (coconut leaves) are used to make the roof. At the same time, the material for making walls uses materials from woven bamboo that have been neatly arranged. Not only that, bamboo can also be used to make doors on *Bale Balaq*. The selection of materials used to make *Bale Balaq* is part of the externalization moment

process, which is influenced by people's stock of knowledge in their daily lives. The stock of knowledge is the accumulation of common sense knowledge (Berger and Luckmann 1990).

Furthermore, by design, *Bale Balaq* illustrates the local wisdom and social system of the Sasak people because each design has a philosophical value along with its rules. The philosophical values in each *Bale Balaq* design are coercive and outside the individual and apply to the public or have become social facts that then shape the community's social actions. Although the rules are not written and institutional in practice, implementing the rules on the *Bale Balaq* is socially recognized and understood from one generation to the next, and it has become a tradition that undergoes institutional-ization (Berger and Luckmann 1990). Berger and Luckman imply that the existence of rules and values in the *Bale Balaq* design is categorized as an objectivation process, which is the result that has been achieved, both mentally and physically, from human externalization activities. The reality of daily life is objectivated by humans or understood as objective reality. Society in Berger and Luckman's view, is an objective reality, in which there is an institutionalization process built on habitual-ization, where there are actions that are carried out repeatedly so that the patterns are seen and continue to be reproduced as actions that are understood and then experience institutional-ization (Sulaiman 2016).

The objectivation process of *Bale Balaq* is reflected in the existence of rules and philosophical values in the design of *Bale Balaq* that are jointly understood by the community in Malaka Village and carried out repeatedly, becoming habitualization and then becoming a tradition. The reality of *Bale Balaq* is maintained by the rules in making *Bale Balaq* that have succeeded in legitimizing the existence of *Bale Balaq* and making *Bale Balaq* an undeniable social reality, even impossible to eliminate. This can be seen from the repeated actions taken in making *Bale Balaq* by following the rules and patterns of *Bale Balaq* building forms under-stood objectively. The rules are reflected in the design of *Bale Balaq* until now and continue to be reproduced as an action that is understood and then experienced institutional-ization. *Bale Balaq* has a design, namely:

1. *Bale Balaq* Pole (*Teken*)

The relatively high pole (*teken*) of *Bale Balaq* has a philosophy that humans can respect other creatures. It is because with the shape of the pole (*teken*) of the *Bale Balaq* which is relatively high, it can not only be used as a place to live by the owner. However, the position of the pole (*teken*) makes it easier for livestock to take shelter under the *Bale Balaq* from the heat or during rain. Even the owner of the *Bale Balaq* can utilize the underbelly to be used as a livestock area. The relatively high model of the pole (*teken*) of the *Bale Balaq* also has a philosophy to protect the owner of the *Bale Balaq* from the threat of wild animals and na'jis. This is because the high position of the pole (*teken*) makes it difficult for animals such as dogs to climb to the top of the *Bale Balaq*.

Bale Balaq has poles (*teken*) that vary from *Bale Balaq* using 6 (six) poles, 9 (nine) poles to 12 poles. The diversity of each joint use has a philosophy that shows a person's social status. *Bale Balaq*, which uses 6 (six) poles, shows the residence of ordinary people. Meanwhile, the *Bale Balaq* with 9 (nine) poles reflects the residence for the head of the hamlet or head of the region in an area, and the *Bale Balaq* with 12

poles shows a residence that is only devoted to the officials in an area.

2. *Bale Balaq* Roof

The roof model of the *Bale Balaq* is made with the front roof model being lower than the back roof. The roof model contains a philosophy that teaches the value of politeness to respect the owner who is inside the *Bale Balaq*. It is because the roof position requires people to lower their heads when they want to enter the *Bale Balaq*.

Bale Balaq roof made with reeds and bobok (dried coconut leaves). Using a *Bale Balaq* roof of reeds and *bobok* (dried coconut leaves) arranged into one unit has the philosophy that no matter how big the problem faced by humans, it can be resolved if they help each other.

3. The End of the *Bale Balaq* Roof

The end of the roof is made with a cross-shaped model with bamboo that is longer than the roof of the *Bale Balaq*. The bamboo, which is longer than the building, is used as a place for chickens (pets) to rest at night. When dawn comes, the chickens will crow to wake the inhabitants to rush to pray and start their activities.

There is a bamboo tip on the roof of the *Bale Balaq*. The two bamboo ends on the roof show the philosophy that in life, two things must always be remembered: the creator and the parents.

4. *Bale Balaq* Joint (*Sendi*)

The pole (*teken*) on the *Bale Balaq* is supported using a joint (*sendi*) made of stone with a flat surface. This holds the philosophy of a message to humans to do everything according to their abilities and not agree to do something they cannot complete.

5. *Bale Balaq* Door

The *Bale Balaq* door is made with a model that joins the left and right sides. So this door is known as the twin door (kuri door). The door model has a philosophy that humans and nature always need each other and influence each other. Where, when humans do damage to nature, humans will be affected by the actions taken and vice versa if humans are kind to nature, then nature will also protect them. In addition, the *Bale Balaq* door is made with art carvings that contain beauty. The carvings contain a philosophy to provide pleasure and comfort for the owner who inhabits the *Bale Balaq*. It cannot be separated from the story of ancient times; when someone likes an object, they decorate it beautifully to please it.

6. *Bale Balaq* Button

The button is the key to the meeting between the wooden joints that are the foundation of the *Bale Balaq*. The connection between the woods has a philosophy of maintaining balance to respect fellow humans and nature.

7. *Bale Balaq* Stairs

The use of stairs in *Bale Balaq* has the philosophy that life is always dynamic, where people are not always in the upper position or happy times, but sometimes they are also in the lower position or difficult times. Therefore, if they want to occupy the upper position or get pleasure, they must always try to go through various processes and efforts from the beginning to occupy the upper position.

8. *Lasah* (Floor) of *Bale Balaq*

The *lasah* (floor) of *Bale Balaq* is made using bamboo (*tereng*) and has a philosophy to facilitate the people living there. With bamboo arranged with a gap or place for air to enter, the atmosphere in the *Bale Balaq* becomes cool (*elen*) and cold (*isis*), making it easier for people to clean dirt if something falls or sticks.

9. *Berugak* in Front of the *Bale Balaq*

The *berugak* built in front of the *Bale Balaq* has a philosophy of respecting others. Where, when there are guests visiting, they will be placed in the *berugak* and for boys who have grown up, then they will sleep on the *berugak*.

10. *Lasah* (Floor) Bottom of the *Bale Balaq*

The *lasah* (floor) of the *Bale Balaq* at the bottom is used as a place to put children's toys, a place to work, a place to make swings for children and a place to put wood.

11. Ladder-shaped Carving Motif

The staircase-shaped carving motif is found on the pole in front of the front porch (*sesangkok*) *Bale Balaq*. The carvings at the bottom of the pole are carved with three meanings like the stairs of life, and at the top there are four stairs in a parallel position, which has a philosophy of Islam, faith, and *iḥsān* and *ma'rifat*.

12. The Maximum Rooms of *Bale Balaq* is 2 rooms

The number of rooms in *Bale Balaq* with 6 (six) and 9 (nine) poles is a maximum of two rooms intended for parents and daughters. While boys since baliqh age (*mumayyiz*) sleep in *berugak* or in the front porch (*sesangkok*) and there are even parents who have also made a house for their children in preparation for when they will get married.

Rules in the *Bale Balaq* Making Process

Bale Balaq's legitimacy is also strengthened in the design, and some rules must be obeyed in the manufacturing process. According to Berger and Luckman, this process is the second level of objectivation of meaning. It is knowledge that has a cognitive and normative dimension because it involves not only explanations but also values. Legitimacy serves to make institutionalized objectivation subjectively reasonable (Berger and Luckmann 1990). It can be seen from the actions that are carried out repeatedly in making *Bale Balaq* by following the rules and patterns of *Bale Balaq* building forms that are understood together objectively. The rules continue to be reproduced as an action that is understood and then experienced institutionalization. Some rules in making *Bale Balaq* that are understood collectively or as an objective reality by the community in Malaka Village are explained as follows:

First, it is not allowed to use jackfruit wood for the floor (*lasah*) of the *Bale Balaq* because it is believed to bring ulcers if you sit on jackfruit wood.

Second, the length and width of the *Bale Balaq* used must not be the same. For example, if the length of the *Bale Balaq* is 4 meters, then it is not allowed to use a width of 4 meters but it is allowed if it is 5 meters or 4.5 meters and so on.

Third, when someone wants to build a *Bale Balaq*, they must prepare starch rice in the form of water and money put into the pot (*periuk*). In addition, they must also prepare a white thread that will be wrapped around the outside of the priuk. The following process is to perform prayer and dhikr activities carried out by at least two people to ask for smoothness and safety in working on the *Bale Balaq*. The pot (*periuk*) water can then be used as medicine when the workers experience a work accident in making *Bale Balaq*. As for the money contained in the pot (*periuk*) will be distributed to the workers who make the *Bale Balaq*.

Fourth, the choice of day in the process of making *Bale Balaq* can be done on all days except Tuesday because it is considered taboo (*pamali*), and the occupants of the *Bale Balaq* cannot feel at home in it.

Fiveth, the rules related to the location of the *Bale Balaq* construction position cannot face east and west, meaning that the roof of the house is not allowed to face the mountain. It is because it is considered to reduce the blessings that are covered by the mountain. Therefore, the best position for the roof of the house that can bring good fortune to the occupants is facing north and south because this position does not face the mountain.

The process of objectivation in the construction of *Bale Balaq* is evident in the rules that must be followed, both during its construction and in the design used. These rules are legitimized because *Bale Balaq* is not merely a building but carries philosophical meanings that reflect the cultural identity, socio-cultural conditions, and social structure of the Malaka Village community. A similar practice can be observed in the Jalawastu community in Ciseureuh Village, Ketanggungan, Brebes. A series of traditions have been passed down through generations when constructing wooden houses. These include beliefs regarding the timing of tree felling, waiting for an auspicious day to begin house construction and specific design rules. Such traditions are deeply connected to the values the Jalawastu community upholds and are inseparable from their socio-cultural conditions (Sahrozat 2018).

The Impact of *Bale Balaq* as Earthquake-resistant Local Wisdom

Bale Balaq also has high cultural values for the Sasak people on Lombok Island. The Sasak people consider the term *Bale Balaq* as a traditional house building that can save its inhabitants from disasters, either the threat of hurricanes or earthquakes. So, until now, *Bale Balaq* has been maintained as a cultural heritage that several communities in the Sasak Tribe must preserve. In addition, *Bale Balaq* is one type of local wisdom used as a way of life, knowledge, and survival strategy (Piutanti, 2015). One of the objectives of exploring the values of local wisdom is for harmony and sustainability of the environment and building systems. *Bale Balaq*'s safety in the face of disaster was expressed by several informants who had experienced an earthquake.

The first statement from H. Salim as the community who lives in *Bale Balaq*:

> "Yes, I have felt the earthquake from the beginning of the biggest earthquake in 1979. The earthquake was big but the *Bale Balaq* that I use was not damaged. The first earthquake was bigger than now because the coconut leaves fused together with the young coconuts, they all fell" (interview, February 14, 2020).

Second**,** the results of an interview with Ahmad Sa'i Aziz as a religious figure revealed:

> "During the Dutch era, he told me that the current earthquake is nothing compared to the Dutch era. The cracks in the ground were so big that animals were buried inside. This coconut leaf touched the ground because of the magnitude of the earthquake, even sitting we could not hold the ground. Then the most feared by the old people was the one meter rupture of the ground, but when we were asked to climb to *Bale Balaq* or *berugak* we were still able to survive. The earthquake was very big. Therefore, there are people who do not want to leave *Bale Balaq*" (interview, January 29, 2020).

Third, information from Sapruddin, a community member who lives in *Bale Balaq*:

> "If I think about it, there were three earthquakes, the first one was in the 1980s and the second one was in 1996, but *Bale Balaq* did not collapse" (interview, March 16, 2020).

Bale Balaq is not only safe from earthquakes, but also from the threat of rain and tornadoes. The results of observations made by

researchers and revealed from the results of interviews with Sapri as a community that lives in *Bale Balaq* revealed:

> "Yes, *Bale Balaq* is very safe from all earthquakes, even if there are strong winds or tornadoes, the main thing is that it is resistant and safe too, even though it shakes a little but it feels good, let it rains, and lightning is also good because there is no glass, everything uses wood" (interview, February 3, 2020).

Sa'ud also conveyed the same thing as the community who lived in *Bale Balaq*:

> "Bale *Balaq* is said to be comfortable for us to sleep in, if it rains it is also resistant and if there is wind it does not shake because the horses are strong and the poles are strong" (interview, February 4, 2020).

A similar condition can be observed in the traditional houses of the Acehnese community, where most of their constructions are earthquake-resistant. This resilience is attributed to the structural elements that can respond longitudinally and transversely to seismic forces (Meutia 2017). The architecture of stilt houses can be further developed as an alternative design model for earthquake-resistant housing (Nuryanto, Mardiana, and Widaningsih 2014). In line with this, the people of Kampung Mahmud demonstrate a form of cultural adaptation and resilience as an effort to adjust to their geographical and environmental conditions by constructing stilt houses as their dwellings. Stilt houses are considered more capable of withstanding earthquakes compared to modern houses that do not adhere to proper construction principles (Suharto and Subantardja 2019).

Stilt houses minimize earthquake vulnerability by incorporating an open space beneath the structure, which serves as an energy dissipation area. This contrasts with modern houses, which often fail to meet earthquake-resistant construction standards and have their physical structures in direct contact with the ground (Driknianto et al. 2024).

Factors causing *Bale Balaq* to withstand the threat of earthquakes, namely:

Fisrt, the design of joints (*sendi*) and poles (*teken*) in *Bale Balaq* is elastic.

The joints (*sendi*) on the *Bale Balaq* are rigid, while the pole is soft or elastic. The joints (*sendi*) and poles on the *Bale Balaq* also have similar properties, namely they are both flat, so that when an earthquake occurs, only the top of the *Bale Balaq* will experience friction. That this is what makes the *Bale Balaq* resistant to earthquake shocks, this is as revealed by Ahmad Sa'i Aziz as, the head of Malaka Village:

> "Yes, it is still made like that (joints), if the old days used river stone, it was more clayey and stronger and not pegged, if now the joints are made of cement and then pegged using iron, for the old people it is not good that they are pegged using iron because when the earthquake shakes it is the earth, on the contrary, the house is above so it is elastic. That's why in Sasak language, tiang means press because it presses the pedestal of the load below, so there is no way it will shake because it is pressed and the one that shakes is the one above. People used to be smart" (interview, January 29, 2020).

The joint (*sendi*) design of *Bale Balaq* is one of the key elements contributing to its earthquake resistance, further supported by the flexibility of the poles (*teken*). Similarly, the stilt houses of the Sundanese community in Kampung Naga, Dukuh, and Kuta feature foundation designs using round, square, and *lisung*-shaped *umpak* (stone bases). These foundation designs are highly resistant to shocks and soil shifts, making them a suitable alternative for earthquake-resistant housing models. Structurally, the *tihang adeg* (main structural columns) are placed on top of the *umpak* without special fastening

techniques, allowing for greater flexibility and resilience against seismic activity (Nuryanto et al., 2014).

Second, *Bale Balaq* building construction is strong. *Bale Balaq* is also resistant to earthquake shaking because the elok, buttons and horses are firmly arranged on the *Bale Balaq*. It is as explained by Sa'ud as a resident of the *Bale Balaq*:

> "Yes, I don't know, but this is what makes it resistant to the earthquake and the strong components of the *Bale Balaq* building, especially the pillars (*pilar*) and joints (*sendi*) " (interview, February 4, 2020).

The earthquake resistance of *Bale Balaq* is attributed to its sturdy and robust construction, which comprises structural elements such as columns, beams, and roof trusses. This characteristic is similar to the stilt house structures of the Rejang ethnic community, which are distinguished by their elevated floors, ranging from 0.6 to 1.40 meters above the ground. The structural elements, including columns, beams, and roof trusses, are made of wood, while the supporting pillars rest on *umpak*-shaped stone bases. The housing design of the Rejang community in Gunung Alam Village demonstrates adaptability to its surrounding environment, particularly as part of an earthquake-prone region (Prihatiningrum 2020).

Third, the pole design is directly buried and has no joints. The design of *Bale Balaq* poles , which are directly planted and do not have joints (*sendi*), is one of the reasons why this building was not damaged during the earthquake. The poles , and joints (*sendi*) are designed only for buildings built in coastal areas. This is according to information obtained from Saprudin, a resident of the *Bale Balaq*:

> "Yes, this is because it is planted directly using wood, so it is strong from earthquakes" (interview, March 16, 2020).

People's opinions about the factors that influence the *Bale Balaq*'s resistance to earthquakes are in line with the main principles of earthquake-resistant construction include 3 things, namely: 1) A simple plan that is symmetrical, 2) Building materials should be as light as possible, 3) Construction systems that are adequate in reducing earthquake risk (Direktorat Jenderal Cipta Karya 2006). Meanwhile, factors affecting the sturdiness of a wooden building include balance, sturdiness, and elasticity.

Conclusion

The findings show that *Bale Balaq* results from human construction formed through dialectical process of externalization and objectivation. Externalization is manifested by the existence of *Bale Balaq* and the selection of materials for making *Bale Balaq*. At the same time, the objectivation process can be seen from every form of building design arranged in *Bale Balaq*, which has rules and philosophical values that are compelling and outside the individual and apply to the public or have become social facts that shape people's social actions. *Bale Balaq* is also believed to provide a sense of security from the threat of natural disasters such as earthquakes. By understanding these social construction processes, academics can understand how people build and construct *Bale Balaq* as an earthquake-resistant building. The ideas that the community has about the critical factors for building earthquake-resistant buildings are expressed in the form of physical buildings that exist in the community and eventually become part of the community's beliefs and practices.

Referring to relevant previous research on the development of RISHA technology in community stilt houses in South Sumatra inspired the author to make this paper a reference for future researchers in the development of earthquake-resistant buildings in West Nusa Tenggara with various sciences or perspectives and become a recommendation to the Center for Housing and Settlement Research and Development (PUSKIM) of the Ministry of Public Works and Public Housing to be able to create earthquake-resistant houses based on local wisdom in West Nusa Tenggara.[]

References

Abidin, Zainal. 2023. "Bale Balaq Rumah Orang Lombok Tahan Gempa." *GenPi.Co*. Retrieved (https://ntb.genpi.co/sasambo/7128/bale-balaq-rumah-tahan-gempa-orang-lombok).

Agustawijaya, D. S., and Syamsuddin Syamsuddin. 2009. *Pengembangan Metode Evaluasi Potensi Resiko Gempa dalam Rangka Mitigasi Bencana Alam: Model Percontohan di Provinsi NTB*.

Arsyad, Muhammad. 2010. "Arsitektur Permukiman Kelompok Sosial Terpinggirkan di Kota Kendari (Perspektif Kebudayaan Kemiskinan)." *Unity - Jurnal Arsitektur* 1(1):34–43.

Bahri, Samsul, and Insannul Kamil. 2023. "Analisis Kekuatan Struktur Rumah Panggung terhadap Gaya Gempa." *Inersia: Jurnal Teknik Sipil* 15(1):1–12. doi: 10.33369/ijts.15.1.1-12.

Berger, Peter L., and Thomas Luckmann. 1990. *Tafsir Sosial Atas Kenyataan: Sebuah Risalah tentang Sosiologi Pengetahuan*. Jakarta: LP3ES.

Direktorat Jenderal Cipta Karya. 2006. *Pedoman Teknis Rumah dan Bangunan Gedung Tahan Gempa*. Jakarta: Departemen Pekerjaan Umum RI.

Driknianto, Muhammad Zaky Bagus, Delyana Salsabila, Agnes Meilani, Muhamad Shipa Maulana, and Silmi Afina Aliyan. 2024. "Adaptasi Rumah Panggung Kampung Mahmud terhadap Kondisi Geografis sebagai Mitigasi Bencana Gempa Bumi." *Media Komunikasi Geografi* 25(1):81–96. doi: 10.23887/mkg.v25i1.70228.

Fahriza, Riza, Nur Imansyah, Nirkomala Nirkomala, and Akhyar Rosidi. 2022. "Belajar Kearifan Suku Sasak dalam Mitigasi Bencana." *Antaranews.Com*. Retrieved (https://www.antaranews.com/berita/2891305/belajar-kearifan-suku-sasak-dalam-mitigasi-bencana).

Fayazi, Mahmood, Isabelle-Anne Bisson, and Eugene Nicholas. 2020. "Barriers to Climate Change Adaptation in Indigenous Communities: A Case Study on the Mohawk Community of Kanesatake, Canada." *International Journal of Disaster Risk Reduction* 49:101750. doi: 10.1016/j.ijdrr.2020.101750.

Hadi, S. "Kerugian Ekonomi Akibat Gempa Lombok Capai Rp 5,04 Triliun." *Tempo.co*. Retrieved (https://www.tempo.co/politik/kerugian-ekonomi-akibat-gempa-lombok-capai-rp-5-04-triliun-852106).

Hiwasaki, Lisa, Emmanuel Luna, Syamsidik, and Rajib Shaw. 2014. "Process for Integrating Local and Indigenous Knowledge with Science for Hydro-Meteorological Disaster Risk Reduction and Climate Change Adaptation in Coastal and Small Island Communities." *International Journal of Disaster Risk Reduction* 10:15–27. doi: 10.1016/j.ijdrr.2014.07.007.

Irda, Rahmaina, Siti Heidi Karmela, and Ferry Yanto. 2024. "Arsitektur Rumah Panggung Masyarakat Melayu di Jambi Kota Seberang Periode Kesultanan Hingga Kemerdekaan." *Istoria: Jurnal ILmiah Pendidikan Sejarah Universitas Batanghari* 8(2):19–25.

Krüger, Fred, Greg Bankoff, Terry Cannon, Benedikt Orlowski, and E. Lisa F. Schipper, eds. 2015. *Cultures and Disasters: Understanding Cultural Framings in Disaster Risk Reduction*. Routledge.

Kusumasari, Bevaola, and Quamrul Alam. 2012. "Local Wisdom-based Disaster Recovery Model in Indonesia." *Disaster Prevention and Management: An International Journal* 21(3):351–69. doi: 10.1108/09653561211234525.

Lumantarna, B., P. Pudjisuryadi, R. M. Soetanto, and G. G. Hindrajaya. 2017. "Local Wisdom to a Sustainable Non-engineered Brick Building." *Procedia Engineering* 171:159–67. doi: 10.1016/j.proeng.2017.01.322.

Maryone, Rini. 2017. "Rumah Pohon Suku Momuna, Yahukimo [The Tree House of Momuna Tribe in Yahukimo]." *Jurnal Penelitian Arkeologi Papua dan Papua Barat* 7(2):85–96. doi: 10.24832/papua.v7i2.20.

Meutia, Erna. 2017. "Pemetaan Sistem Struktur Konstruksi Rumah Tradisional Aceh dalam Merespon Gempa." *Jurnal Koridor* 8(1):65–72. doi: 10.32734/koridor.v8i1.1330.

Miles, Matthew B., A. Michael Huberman, and Johnny Saldana. 2014. *Qualitative Data Analysis: A Methods Sourcebook*. Jakarta: UI-Press.

Nukman, Harianto. 2018. "Ini Rumah Anti Gempa Asli Lombok." *Detik Travel*. Retrieved (https://travel.detik.com/domestic-destination/d-4227428/ini-rumah-anti-gempa-asli-lombok).

Nuryanto, Nuryanto, Riskha Mardiana, and Lilis Widaningsih. 2014. "Pengembangan Model Desain Rumah Ramah Gempa di Desa Jayapura Kec. Cigalontang, Tasikmalaya Berbasiskan Lokalitas Arsitektur Tradisional Sunda." *Jurnal Tesa Arsitektur* 12(1):1–17.

Pelling, Mark. 2007. "Learning from Others: The Scope and Challenges for Participatory Disaster Risk Assessment." *Disasters* 31(4):373–85. doi: 10.1111/j.1467-7717.2007.01014.x.

Pribadi, K. S., M. Abduh, R. D. Wirahadikusumah, N. R. Hanifa, M. Irsyam, P. Kusumaningrum, and E. Puri. 2021. "Learning from Past Earthquake Disasters: The Need for Knowledge Management System to Enhance Infrastructure Resilience in Indonesia." *International Journal of Disaster Risk Reduction* 64:102424. doi: 10.1016/j.ijdrr.2021.102424.

Prihatiningrum, Atik. 2020. "Karakter Bentuk Hunian Suku Rejang di Daerah Rawan Gempa (Studi Kasus: Desa Gunung Alam, Kabupaten Lebong)." *Arsitektura* 18(1):84. doi: 10.20961/arst.v18i1.40786.

Raihan, M., A. Siswanto, and L. Teddy. 2020. "Pengembangan Arsitektur Teknologi Rumah Tahan Gempa Risha Menjadi Rumah Panggung Sumatera Selatan." in *Prosiding AVoER XII*.

Resti, Piutanti. 2015. "Pemaknaan Kembali Kearifan Lokal dalam Arsitektur (Keterkaitan Manusia, Budaya, dan Alam Nusantara)." *Seminar Nasional SCAN#6:2015 Finding the Fifth Element After, Earth, Wind, and Fire* 14–21.

Sahrozat. 2018. "Pengungkapan Identitas Masyarakat Jalawastu Melalui Kearifan Lokal 'Rumah Kayu': Tinjauan Sosial-Budaya." Pp. 491–512 in *Proceeding INUSHARTS (International Young Scholars Symposium)*.

Sari, Dewi Ratna, and Kuncoro Bayu Prasetyo. 2017. "Konstruksi Sosial Masyarakat terhadap Pemandu Karaoke: Studi Kasus di Desa Botorejo Kecamatan Wonosalam Kabupaten Demak." *JSW (Jurnal Sosiologi Walisongo)* 1(1):17–32. doi: 10.21580/jsw.2017.1.1.1935.

Savitri, Fivien Nur. 2018. "Gempa Bumi Lombok, Banyak Masyarakat di Pengungsian Kesulitan Air Bersih." *ITB.Ac.Id*. Retrieved (https://itb.ac.id/berita/detail/56744/directories).

Setyahadi, Agung, Prasetya Eko P, Ahmad Arif, and Ingki Rinaldi. 2019. "Rumah Tradisional Tahan Gempa." *Kompas.Id*. Retrieved (https://jelajah.kompas.id/ekspedisi-cincin-api/baca/rumah-tradisional-tahan-gempa/).

Suharto, B., and S. Subantardja. 2019. "Adaptasi Rumah Panggung Kampung Mahmud terhadap Kondisi Lingkungan." *Jurnal Arsitektur Nusantara* 7(2):123–35.

Sulaiman, Aimie. 2016. "Memahami Teori Konstruksi Sosial Peter L. Berger." *Society* 4(1):15–22. doi: 10.33019/society.v4i1.32.

Wang, Zhiqiang, Jianbo Liu, Na Xu, Chunbo Fan, Yida Fan, Shuoxin He, Linxi Jiao, and Nannan Ma. 2019. "The Role of Indigenous Knowledge in Integrating Scientific and Indigenous Knowledge for Community-Based Disaster Risk Reduction: A Case of Haikou Village in Ningxia, China." *International Journal of Disaster Risk Reduction* 41:101309. doi: 10.1016/j.ijdrr.2019.101309.

Weichselgartner, Juergen, and Patrick Pigeon. 2015. "The Role of Knowledge in Disaster Risk Reduction." *International Journal of Disaster Risk Science* 6(2):107–16. doi: 10.1007/s13753-015-0052-7.

Wismabrata, Michael Hangga, and Caroline Damanik. 2018. "5 Fakta Terbaru Gempa Lombok, Kerugian Rp. 8,8 Triliun Hingga Kekurangan Air Bersih." *Kompas.Com*. Retrieved (https://regional.kompas.com/read/2018/08/28/16462991/5-fakta-terbaru-gempa-lombok-kerugian-rp-88-triliun-hingga-kekurangan-air).

Zulfakriza, Z. 2018. "Melihat Kembali Gempa Lombok 2018 dan Sejarah Kegempaannya." *Kompas.Com*. Retrieved (https://regional.kompas.com/read/2018/09/23/11321551/melihat-kembali-gempa-lombok-2018-dan-sejarah-kegempaannya).

This page has been intentionally left blank.