JOURNEY OF VERNACULAR ROOF TYPOLOGY IN SLAGI VILLAGE

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ABSTRACT

Vernacular architecture is identified as a form of architecture that evolves with the times. The concept of this architecture remains relevant because rural communities tend to build their homes based on longstanding traditions passed down through generations. However, changes in vernacular architecture can occur due to various factors, including adaptation to modern developments and residents' needs. In this article, the evolution of vernacular roof forms from the past to the present is analyzed, focusing on the vernacular roofs of houses in Slagi Village. Through a comparative study of old and new vernacular house roofs, the evolution of vernacular roof architecture is explored, and the factors influencing roof shape changes are investigated. Descriptive and comparative analysis approaches are used to review the differences in roof forms, and the cultural and environmental implications of these changes are understood. Findings show significant changes in vernacular roof forms from the past to the present, influenced by technological advancements and architectural trends. This article provides deep insights into the transformation of vernacular architecture and highlights the importance of preserving cultural heritage in the context of changing times. With a better understanding of the evolution of vernacular architecture, it is hoped to raise awareness of the importance of safeguarding and preserving cultural heritage for future generations.

Keywords: *Typology, Vernacular Roof, Change*

INTRODUCTION

Vernacular architecture has long been a focal point in the world of architecture as an expression of cultural diversity and local context, referring to architectural forms that evolve from the traditions and customs of local communities, often adapting to changing times and environments. The exact origin of this concept is unknown and is considered to have emerged inadvertently, but it is now recognized as a result of human ingenuity surpassing economic and aesthetic considerations (Rudofsky, 1964). Despite its ancient roots and unclear history, this concept still exists and is

particularly used in rural areas, primarily due to its practicality and affordability (Janetius, 2020). Especially among communities lacking access to education or architectural expertise. In the context of ongoing modernization, rural communities continue to explore architectural styles for their dwellings while mimicking existing styles. The forms of vernacular architecture have become more diverse, evolving from traditional forms towards modern ones. Nevertheless, these changes remain integral to vernacular architecture itself because, according to theory, this concept adapts to local physical, social, and cultural conditions (Mentayani, 2012).

This raises questions about the stories behind the development of vernacular concepts and the extent of the changes that have occurred. By understanding these changes, we can appreciate the cultural values and traditions embedded within while accommodating the evolving times. Furthermore, it can help identify trends and patterns of change that may occur, along with their implications for environmental sustainability and cultural heritage preservation.

THEORY / RESEARCH METHODS

Vernacular Architecture

The term vernacular architecture was first associated with the architectural historian Bernard Rudofsky. Rudofsky described this concept in his book titled Architecture Without Architects, published in 1964. In this book, Rudofsky discusses vernacular architecture built by ordinary people without the involvement of professional architects. His contribution to popularizing the concept of vernacular architecture was significant in the world of architecture, as he conveyed the idea that architectural skill is not always limited to professional architects (Rudofsky, 1964)

Vernacular buildings are constructed by local communities who do not possess expertise in architecture, and are believed to adapt to the physical, social, and cultural conditions of the locality. They utilize local physical, social, cultural, religious, technological, and material resources. The typology of these early buildings includes dwellings and other structures that evolved within traditional communities, aiming to embody values and meet the needs of the local population. The function, meaning, and appearance of these buildings are heavily influenced by the social structure, beliefs, and behavioral patterns of the community that builds them (Mentayani, 2012).

One of the main characteristics of vernacular architecture is the diversity of building forms that vary in each region. This diversity is caused by various factors influencing construction. In hot coastal areas, vernacular buildings are designed to withstand heat (Nursaniah, Izziah and Laila Qadri, 2019). In cold mountainous regions, vernacular buildings are designed to retain warmth, often featuring thick walls and minimal openings (Fauziah, 2014). Furthermore, cultural aspects also influence building design, for example, in the choice of decorative motifs or the use of distinctive colors in vernacular architecture.

Vernacular architecture is often associated with traditional architecture due to its similar forms (Figure 1). However, what distinguishes vernacular architecture is

its more ambiguous or informal appearance, as it does not adhere to the rules or orders found in traditional architecture (Suharjanto, 2011). In short, the similarity between vernacular architecture and traditional architecture is only superficial in terms of appearance.

Figure 1. Vernacular Houses Resembling Traditional Homes
Source: (Anggit, 2011)

Javanese Vernacular Roof

The evolution of traditional Javanese roof designs reflects cultural values and social hierarchies within Javanese society. Understanding this evolution requires examining various viewpoints related to the philosophy of form, typology of structures, societal perspectives on royal governance systems, and the diverse sizes and shapes of traditional Javanese roofs. Through this analysis, significant developments have been observed in the fundamental forms of traditional Javanese roofs (Figure 2 & Figure 3) (Hermawan and Prihatmaji, 2019).

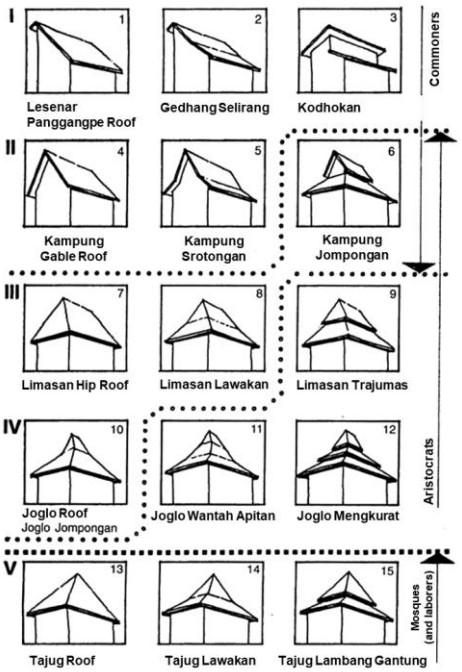

Figure 2. Basic Forms of Javanese Vernacular Roofs
Source: (Frick, 1997; Anonymous, 2017)

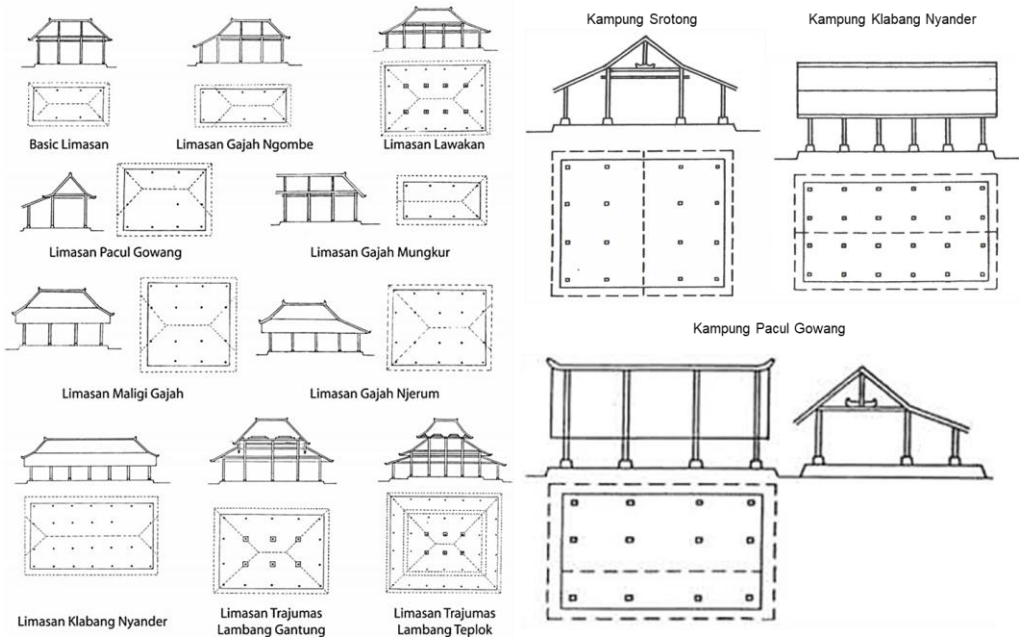

Figure 3. Examples of Diversity in Javanese Vernacular Roof Forms
Source: (Wibowo, Murniatmo and Dh., 1998)

According to (Sardjono, 2022), the five roof forms and their development are as follows:

Panggang Pe

The structure is simple, featuring a single-sloped roof supported by four pillars, resulting in a small dimension and minimal use of materials (Figure 4). Originally used for drying harvested crops, it was often considered unsuitable as a living space by Javanese communities. Typically used as a temporary house, storage area, or shelter for livestock. Its evolved forms are not as numerous, such as the *Panggang Pe Trajumas, Panggang Pe Gedhang Selirang*, and others. Most placements of the *Panggang Pe* roof serve as extensions or additional elements to complement other roof types. Nowadays, it is becoming increasingly popular as an element in minimalist house architecture with sloped roofs.

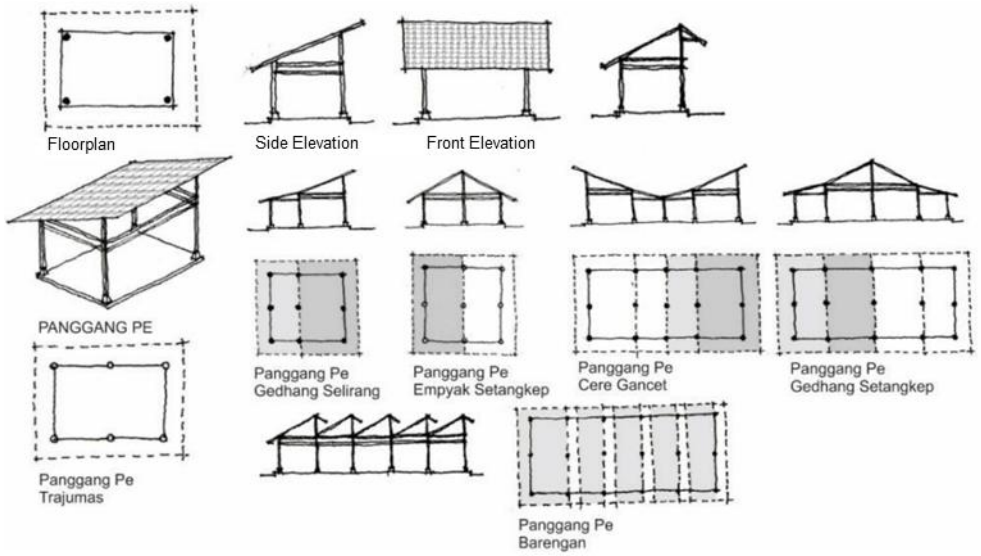

Figure 4. Schematic Sketches of *Panggang Pe* and its Evolved Forms
Source: (Sardjono, 2022)

Pelana/Kampung

The *Kampung* roof consists of two sloping planes that meet at the peak of the building, resembling the *Panggang Pe* roof but reflected and combined at the highest point, without a central roof section (Figure 5). This construction of two sloping roof planes allows for a larger shaded area and is suitable for housing for most communities, with affordable costs for lower-middle-class families. The front view of the building presents a strong horizontal impression from the roof peak line, while the side view gives a slight vertical impression with the converging roof slopes at the peak where the molo is located. Typically built on a rectangular plan with four pillars connected by main beams (*Belandar* and *Pengeret*), sometimes reinforced with tie beams (*Sunduk* and *Kili*). The dual-sloping roof design facilitates better rainwater drainage and even distribution of roof loads. Its evolved forms

include *Kampung Pacul Gowang* or *Kampung Srotong*, *Kampung Klabang Nyander*, *Kampung Lambang Teplok*, *Kampung Gajang Ngombe*, *Kampung Gajah Njerum*, and *Kampung Doro Gepak* roofs, which introduce additional aesthetic elements with triangular walls (Gevel) known as *Tutup Keong*. The *Kampung* roof is often used as an additional roof at the front, side, or rear of the main building, especially to shelter service areas.

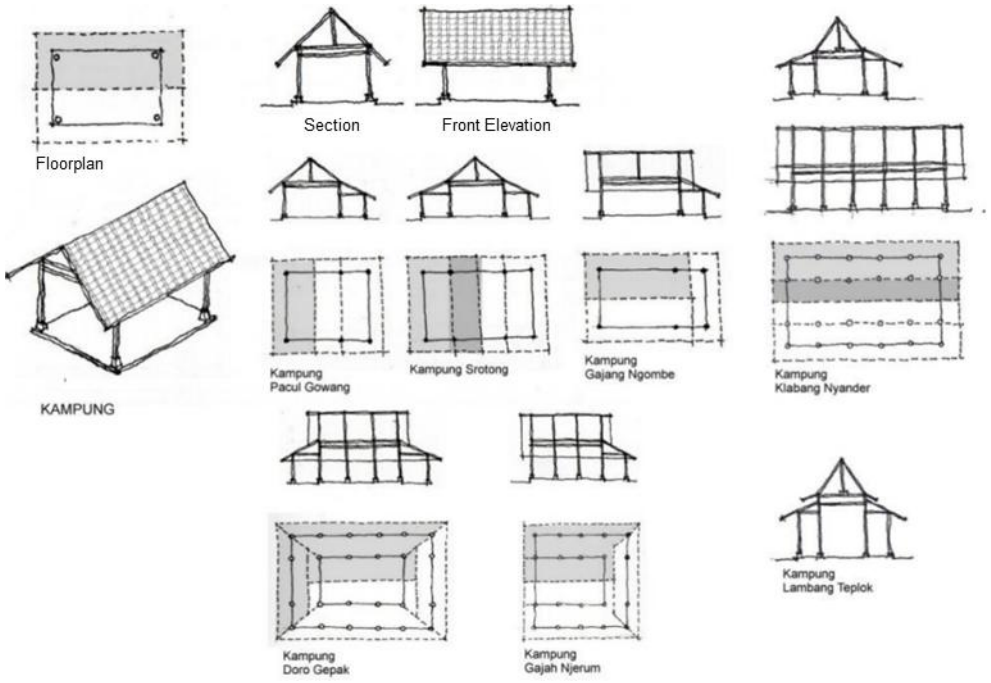

Figure 5. Schematic Sketches of *Pelana*/*Kampung* and its Evolved Forms
Source: (Sardjono, 2022)

Limasan

The *Limas* or *Limasan* roof is an evolution of the *Pelana*/*Kampung* roof, featuring additional sloping planes on the sides to create four sloping planes with a horizontal element at the peak called the *Molo*, and four diagonal ridges called *Dudur* (Figure 6). The presence of sloping roof planes on the sides increases rainwater efficiency, strengthens the roof structure, and allows for larger roof dimensions compared to the *Kampung* roof. Developments of the *Limasan* house include *Limasan Maligi Gajah*, *Limasan Pacul Gowang*, *Limasan Gajah Ngombe*, *Limasan Gajah Njerum*, and others. The front view of a *Limasan* building shows vertical elements through the sloping lines of the *Jurai*, while the horizontal elements are reduced with shorter *Molo* beams. The construction of a *Limasan* building is more complex and requires greater skill and more materials. *Limasan* houses are often built by the middle class to enhance their social status.

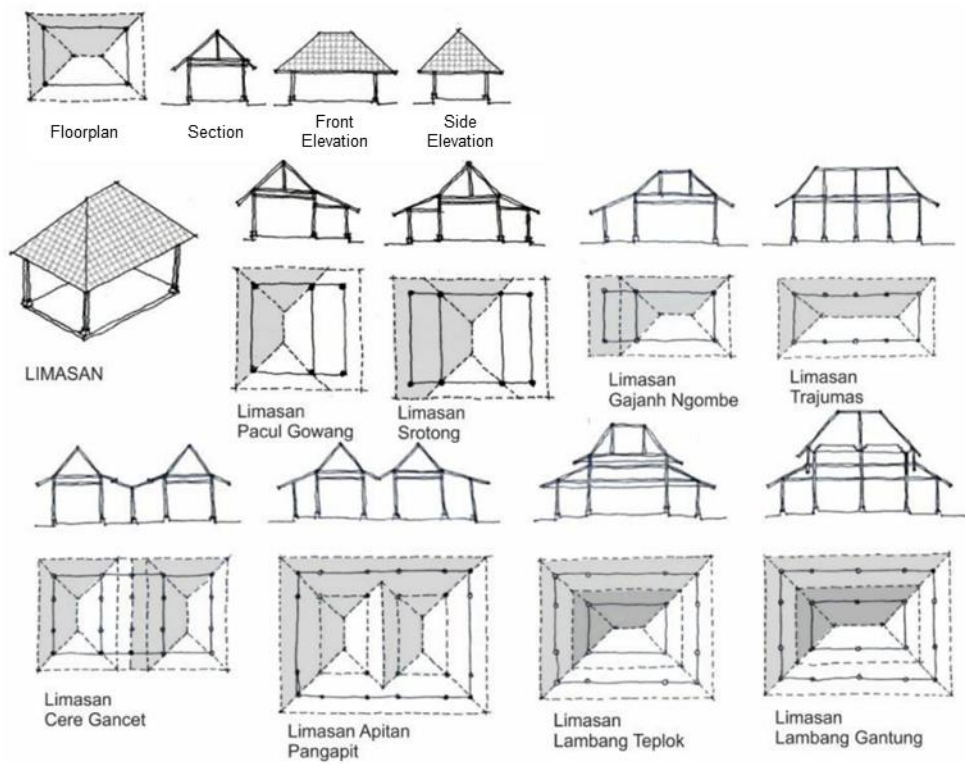

Figure 6. Schematic Sketches of *Limasan* and its Evolved Forms
Source: (Sardjono, 2022)

Joglo

Known as the pinnacle of Javanese house roof classifications, referring to the merging of two *Tajug* roofs to make them habitable. As the main level in Javanese house architecture, the *Joglo* roof symbolizes grandeur and complexity higher than that of the *Limasan*. Consisting of two or even three to four slopes, the *Joglo* roof presents a stronger vertical impression compared to the *Limasan* roof (Figure 7). Although initially the *Joglo* roof may appear as an extension of the *Limasan* or *Limasan Lawakan* roof, its construction is different. The upper part of the roof, which has steeper slopes, is called *Brunjung* and is supported by four main columns called *Soko Guru*, unlike the *Limasan*, which can be supported by more columns. At the top, there are *Belandar* and *Pangeret* beams that form the basis for the arrangement of *Tumpang Sari* beams. At the bottom, these beams are reinforced with *Sunduk* and *Kili*. The lower part of the roof, which is flatter, is called *Pananggap*, supported by columns surrounding the *Soko Guru*. This type of roof is commonly found only in noble or ruling houses. In coastal areas like Demak and Kudus, *Joglo* houses are more prevalent even though their occupants may not be nobility, but their layout is simpler and more compact. The development of the *Joglo* roof involves adding additional roofs and supports, resulting in three-tiered roofs, as seen in *Joglo Sinom*. Other variations include *Joglo Jompongan*, *Joglo*

Pangrawit, *Joglo Mangkurat*, and others. These developments often come with improved material quality and ornaments, creating magnificent and sacred buildings.

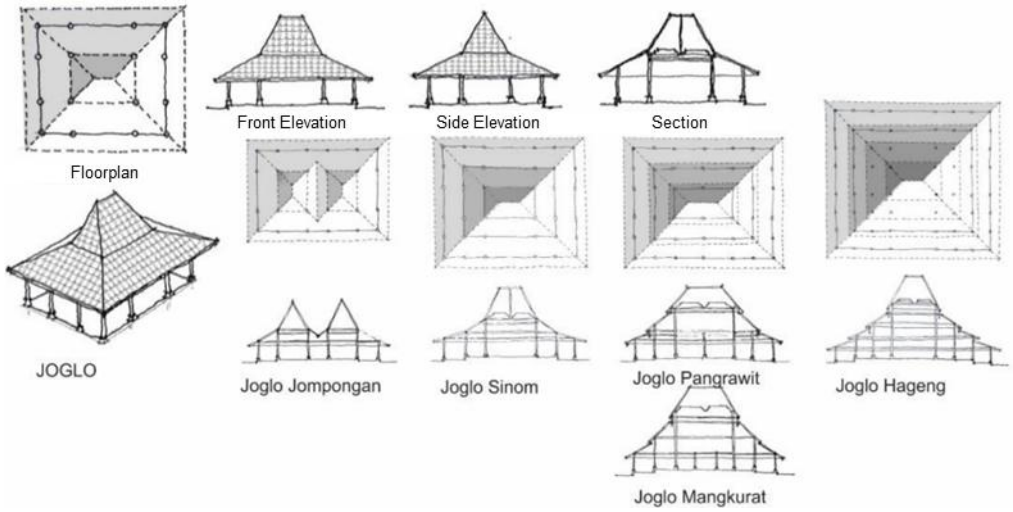

Figure 7. Schematic Sketches of *Joglo* and its Evolved Forms
Source: (Sardjono, 2022)

Tajug

Usually used for sacred buildings such as places of worship. The pointed *Tajug* roof shape has been known for a long time in Javanese history and can be found in Hindu and Shiva temples. The *Tajug* roof is often used as a dome roof, especially in the form of single-tiered *Tajug* buildings (Figure 8). However, in villages, the *Tajug* roof is also used to cover *Mushola* or *Langgar* buildings with two levels. In larger mosques, the *Tajug* roof is used in three tiers and combined with various types of roofs for its supporting buildings. Although the *Tajug* roof is one of the five main types of traditional Javanese roofs, it is rarely used for residential purposes. The *Tajug* roof has a distinctive core shape, with a square plan, four pillars, and main beams supporting *Dudur* at its four corners. The *Dudur* tapers and meets at the roof peak, bound by a cube beam called Sirah. In its development, the *Tajug* roof is typically expanded in four directions by adding flatter roofs. Variations of the *Tajug* roof include *Tajuk Lawakan*, *Tajuk Lawakan Lambang Teplok*, *Tajuk Mangkurat*, and others. In religious buildings like mosques, the *Tajug* roof usually covers the main prayer hall, while the veranda uses the *Limasan* roof, except on the *Mihrab* side. *Tajug* roofs on mosques generally have three tiers separated by vertical elements like walls or lattices for lighting and air circulation.

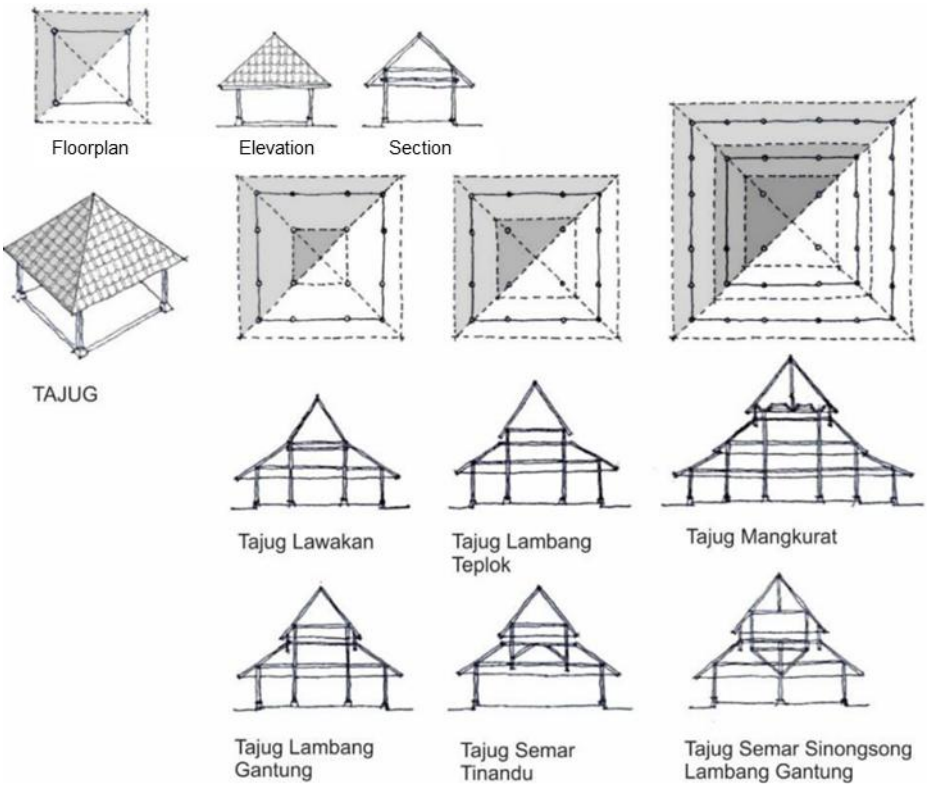

Figure 8. Schematic Sketches of *Joglo* and its Evolved Forms
Source: (Sardjono, 2022)

Initially, the use of roof forms was based on social status, economic factors, and the intended purpose of the building (Wibowo, Murniatmo and Dh., 1998). With the hierarchy division of *Joglo* for nobility, *Limasan* for the middle class, and *Pelana*/*Kampung* for the lower class (Roosandriantini, Santoso and Ambarwati, 2019). However, because vernacular architecture does not adhere to strict rules like traditional architecture, the use of vernacular roofs becomes more flexible and diverse in form.

In the regions of Central Java, East Java, and Yogyakarta, the *Limasan* roof becomes the primary choice because houses are more easily expandable. In contrast, the *Pelana* roof is recognized as belonging to the lowest social class, *Panggang-pe* is mostly used for non-permanent structures, *Tajug* roofs are mainly for religious buildings, and the *Joglo* roof was originally reserved exclusively for the upper noble class (Idham, 2018; Kusuma & Damai, 2020).

Research Methods

A qualitative descriptive research method aims to portray and explain phenomena in detail to achieve a deep understanding, explore underlying meanings, and identify emerging patterns. In the context of researching changes in vernacular roofs, a

qualitative descriptive approach involves collecting data through interviews, observations, and document analysis to gain a comprehensive understanding of the changes in roof forms and vernacular architecture from cultural, social, and environmental perspectives. Meanwhile, a comparative analysis method is used to compare two or more cases or phenomena to discover similarities, differences, or patterns among them.

This study began by classifying the case study objects into two distinct age groups: houses older than 100 years and those built within the last 25 years. These two categories were selected to represent contrasting temporal phases, enabling a chronological analysis of changes in Javanese vernacular roof design. Within each group, samples were then randomly selected, with the primary criterion being that the houses exhibit identifiable Javanese vernacular roof typologies such as *Panggang Pe, Limasan, Pelana, Joglo,* or *Tajug*. This approach ensures unbiased selection while capturing a diverse range of roof forms across different time periods. Slagi Village was chosen as the research site due to its unique context, where both traditional and contemporary houses with vernacular roof characteristics coexist in close proximity. This setting provides an ideal opportunity for a contextual comparative study on the evolution of roof geometry, materials, and ornamentation in response to socio-cultural, economic, and environmental transformations.

Based on the theoretical framework of Javanese vernacular architecture, the parameters of roof form selected for analyzing the evolution of roof design encompass geometry of form, material, and ornamentation. The geometry of form pertains to the type and configuration of roofs, such as *Panggang Pe, Limasan, Pelana, Joglo,* or *Tajug*, which reflect social hierarchies, cultural values, and functional adaptations to the environment. The material of the roof, ranging from traditional handmade clay tiles to modern zinc, illustrates local wisdom, resource availability, and shifts in economic and technological contexts over time. Meanwhile, ornamentation, particularly the *Wuwung* or ridge decorations, serves as a symbol of cultural identity and communal pride, while also highlighting the evolving aesthetic dynamics influenced by social changes and modernization. These three parameters are chosen for their relevance in elucidating the socio-cultural significance and environmental performance of Javanese vernacular roofs, as articulated in the theories.

The research is conducted in Slagi Village, Jepara Regency because it is an old village where the architectural timeline can still be observed (Figure 9). Several samples of vernacular house roofs will be selected and divided into two groups: the first group consists of 20 vernacular house roofs aged over 100 years with no changes, while the second group consists of 20 vernacular house roofs aged less than 25 years. The existing samples will then be visually analyzed to identify differences in their roof forms. By comparing the visual elements of old and new vernacular houses, the study aims to identify patterns of change and emerging trends over time. Deep interviews will be conducted with 40 homeowners to understand their perspectives on the changes in vernacular architecture and the factors influencing these changes.

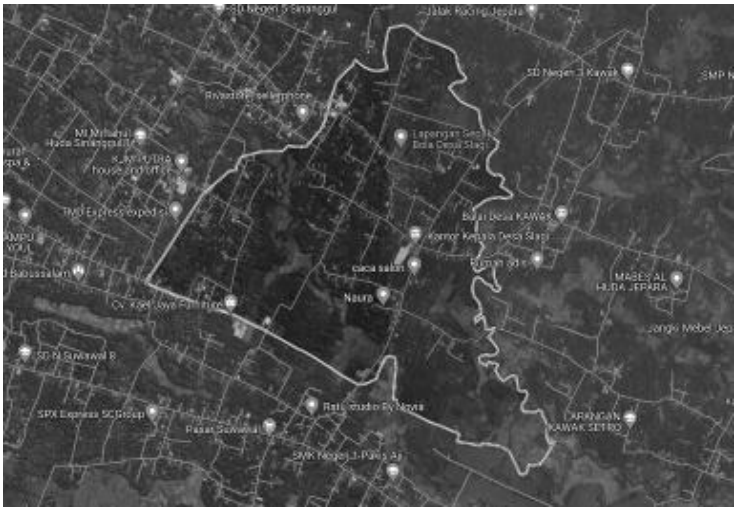

Figure 9. The Research Location
Source: Google Street View, 2024

RESULTS AND DISCUSSION

To provide a structured comparative analysis of vernacular roof evolution in Slagi Village, the roof types observed in 40 sampled houses (20 over 100 years old, 20 less than 25 years old) are classified into five Javanese vernacular typologies—*Panggang Pe, Pelana, Limasan, Joglo*, and *Tajug*—using three key categories: Geometri, Material, and Ornamen. These categories, derived from the theoretical framework of Javanese vernacular architecture, enable a systematic examination of form, function, and cultural significance. Form theory, which analyzes shape, proportion, and spatial organization, is applied to deepen the discussion, aligning with Mentayani's (2012) emphasis on vernacular adaptation to local physical, social, and cultural conditions and Rudofsky's (1964) view of vernacular architecture as an expression of community ingenuity.

1. *Panggang Pe*
   - Prevalence: 2 (10%) in older houses used as terrace, 9 (45%) in newer houses primarily used as an extension to main roofs for carport.
   - Geometry: A single-sloped roof supported by four pillars, creating a minimalist, rectangular form with small dimensions.
   - Material: Handmade clay tiles in older houses and zinc in newer houses
   - Ornament: Not found.
2. *Pelana (Kampung)*
   - Prevalence: 2 (10%) in older houses, 19 (95%) in newer houses with hybrid form primarily used as terrace.
   - Geometry: Two sloping planes converging at a ridge, forming a gabled structure with a horizontal ridge line and optional triangular gables. The form theory highlights its balanced proportions, ideal for cost-effective residential designs.

- Material: Handmade clay tiles in older houses, mix of handmade clay tiles and factory-produced clay or zinc in newer houses.
- Ornament: No ornaments in older due to lower-class associations, in newer houses, a few features *Wuwung*, reflecting modern aesthetic trends.

3. *Limasan*
   - Prevalence: 18 (80%) in older houses, 6 (30%) in newer houses with hybrid form.
   - Geometry: Four sloping planes with a central *Molo* beam and diagonal Dudur ridges, creating a robust, pyramid-like form. The form theory underscores its harmonious vertical-horizontal interplay, optimizing rainwater efficiency and structural stability for larger homes.
   - Material: Handmade clay tiles in older houses, mix of handmade clay tiles and factory-produced clay or zinc in newer houses.
   - Ornament: *Wuwung* is prevalent in 70% of older *Limasan* roofs (e.g., *Limasan Maligi Gajah*), symbolizing cultural pride, but not found in newer ones, indicating a shift to form-driven aesthetics.
4. *Joglo*
   - Prevalence: Not found, reserved for non-residential use due to cost and cultural significance.
   - Geometric: Multi-tiered with steep Brunjung slopes and flatter Pananggap sections, supported by *Soko Guru* columns. Its complex geometry, with layered *Tumpang Sari* beams, conveys grandeur and nobility, per form theory's focus on symbolic proportions.
   - Material: Not applicable (used for non-residential buildings)
   - Ornament: Not applicable (used for non-residential buildings)
5. *Tajug*
   - Prevalence: Not found, exclusive to religious structures like *mushola* or mosques.
   - Geometric: A pointed, dome-like form with a square plan and converging *Dudur* ridges meeting at a *Sirah* beam. Form theory emphasizes its compact, sacred geometry, suited for religious spaces.
   - Material: Not applicable (used for non-residential buildings)
   - Ornament: Not applicable (used for non-residential buildings)

The evolution of vernacular roof typologies in Slagi Village, analyzed through the categories of geometry, material, and ornament, reveals a dynamic interplay of cultural, social, and environmental factors shaping Javanese vernacular architecture. The classification of five typologies—*Panggang Pe, Pelana, Limasan, Joglo*, and *Tajug*—demonstrates significant shifts from older houses (>100 years) to newer ones (<25 years), reflecting both adaptation to modern influences and challenges to cultural preservation.

Older houses predominantly feature *Limasan* roofs (80%), characterized by a robust four-plane geometry optimized for rainwater efficiency, constructed with handmade clay tiles, and adorned with *Wuwung* ornaments in 70% of cases, symbolizing middle-class cultural pride (Sardjono, 2022). *Pelana* roofs, present in 10% of older houses, utilize simpler two-plane geometry without *Wuwung*,

reflecting lower-class associations. *Panggang Pe*, found in 10% as terrace extensions, employs minimalist single-slope geometry, while *Joglo* and *Tajug* are absent in residential contexts, reserved for non-residential sacred or noble structures due to their complex and costly geometries.

In contrast, newer houses show a marked shift toward *Pelana* roofs (95%), often in hybrid forms used as terraces, leveraging simpler geometry for cost-effectiveness and compatibility with modern materials like zinc or factory-produced clay tiles. *Limasan* persists in 30% of newer houses, but *Wuwung* ornaments are absent, indicating a move away from traditional aesthetics toward form-driven designs influenced by global trends. *Panggang Pe* increases to 45% as carport extensions, reflecting practical adaptations, while *Joglo* and *Tajug* remain exclusive to non-residential use, underscoring their cultural and economic exclusivity.

This evolution aligns with Rudofsky's (1964) view of vernacular architecture as an expression of community ingenuity, adapting to changing contexts (Mentayani, 2012). The shift to *Pelana's* simpler geometry and modern materials reflects social democratization and economic pressures, reducing traditional hierarchies (Suharjanto, 2011). However, the decline in *Wuwung* and traditional clay tiles, coupled with concerns about zinc's thermal inefficiency, highlights environmental trade-offs and risks to Javanese cultural identity, as noted by 25% of homeowners.

The classification based on geometry, material, and ornament underscores the need to balance modernization with heritage preservation. Stakeholders should promote sustainable materials and traditional craftsmanship through community education and incentives, ensuring that vernacular architecture retains its cultural roots while adapting to contemporary needs. This study emphasizes the importance of documenting vernacular roof typologies to safeguard Javanese heritage for future generations.

Figure 10 features research objects of vernacular roofs that are over 100 years old, predominantly in the form of *Limasan*, particularly *Limasan Maligi Gajah*. The *Limasan Maligi Gajah* is a variant with extended *dudur* ridges and ornate *Wuwung*. All roofs are made of manually crafted clay due to the lack of technology in the past. The most striking feature is the presence of ornaments (*Wuwung*) adorning the top and slopes (*Nok*/*Bubungan*) of the roofs. In the few instances of *Pelana* roofs observed, no ornaments (*Wuwung*) are visible. This is likely because homeowners with *Pelana* roofs during that period were generally lower-income individuals who did not prioritize the aesthetic aspects of their homes.

Based on interviews with homeowners, the selection of roof models was based on the most commonly used roof types during that time. The lack of expertise in architecture and limited technological development may have been reasons why people were unable to experiment with roof shapes. This also contributed to the rarity of development beyond the five basic roof forms. On the other hand, the *Limasan* shape was the most suitable for houses because most houses had a rectangular layout with elongated sides on the right and left. A *Pelana* roof, meanwhile, would result in a layout elongating towards the back. Although the *Joglo* form could also be used, few people chose it due to its higher cost requirements.

Figure 10. Roofs of Javanese Vernacular Houses Over 100 Years Old

Figure 11. Javanese Vernacular Roofs Less Than 25 Years Old

In the past, the popularity of the *Limasan* roof was believed to be influenced by the existing hierarchy of social status within traditional architecture. Therefore, people did not use the *Joglo* shape, which reflected the noble class, and were also reluctant to use the *Pelana*/*Kampung* shape, which represented the lower class of society. Although over time, this hierarchical division became less relevant, people still tended to choose the forms that were commonly used. Other roof forms such as *Tajug* and *Panggang-Pe* were not chosen because they were rarely used for residential houses. According to some residents, the old mosques in Slagi Village used to have *Tajug* roofs but were later replaced with more modern designs. Meanwhile, *Panggang-Pe* roofs are usually added as extensions to the main roof.

Figure 11 displays research objects of vernacular roofs less than 25 years old. These roofs exhibit more complex shapes, predominantly in the form of *Pelana* or Kampung. The basic forms of the five vernacular roofs are only used by 10% sample (2 houses), which use *Limasan* and *Pelana*. Only a few houses still feature ornaments (*Wuwung*), and their use is minimal compared to old vernacular houses.

Based on interviews with homeowners, the choice of roofs is influenced by architectural trends supported by technological advancements. Homeowners can see roof designs on the internet and apply them to their homes. Technological advancements in construction also facilitate exploration of more diverse roof shapes. Evolving roofing materials and construction methods also make it easier to create various roof forms. Previously focused on ornaments (*Wuwung*), aesthetic aspects now primarily focus on roof shapes. Economic factors also influence roof selection, where homeowners with higher economic means tend to experiment with more complex roof shapes, while those with limited economic means prefer simpler forms. Some homeowners do not directly choose their roof design but rely on builders. In such cases, roof selection is likely based on the house's floor plan.

Although roof shapes have undergone many changes, the dominance of *Limasan* and *Pelana* forms remains consistent. This happens because the old shape that is often used still influences new homeowners in choosing the shape of their roof. Roof forms derived from *Panggang-Pe*, *Joglo*, and *Tajug* are very rarely encountered, with *Joglo* or *Tajug* roofs more commonly used for mosques or government buildings. However, in many cases, variants of these forms are more commonly used.

Integrated Analysis of Cultural, Social, and Environmental Influences

Vernacular architecture, as articulated by Rudofsky (1964), embodies the traditions and ingenuity of local communities, adapting to physical, social, and cultural conditions (Mentayani, 2012). In Slagi Village, the transformation of vernacular roofs from predominantly *Limasan* to more diverse *Pelana*/*Kampung* forms illustrates how these factors converge to shape architectural evolution.

The cultural significance of roof forms in Slagi Village is rooted in Javanese architectural heritage, where roof typology historically reflected social status (Sardjono, 2022). Among older houses (>100 years), 80% featured *Limasan* roofs, particularly the *Limasan Maligi Gajah*, chosen for their cultural prominence as a middle-class symbol, avoiding the elite *Joglo* form. Interviews revealed that 70% of

these homeowners valued *Wuwung* ornaments on the ridge or apex as markers of traditional craftsmanship and cultural pride. These ornaments, made from clay, were seen as enhancing the aesthetic and symbolic value of the home. In contrast, newer houses (<25 years) show a cultural shift, with only 10% retaining *Wuwung* ornaments and 65% of homeowners citing inspiration from modern architectural trends accessed via the internet. This aligns with the adaptability of vernacular architecture to evolving cultural contexts (Mentayani, 2012). However, 25% of respondents expressed concern that the decline of traditional forms like *Limasan* and *Joglo* threatens Javanese cultural identity, highlighting a tension between globalization and heritage preservation.

Social factors, including economic status and community trends, significantly influence roof selection. Historically, Javanese roof forms adhered to a social hierarchy—*Joglo* for nobility, *Limasan* for the middle class, and *Pelana*/*Kampung* for the lower class (Roosandriantini, Santoso and Ambarwati, 2019). Interviews with owners of older houses indicated that 85% chose *Limasan* roofs to reflect middle-class aspirations, avoiding *Pelana* due to its association with lower status. The *Panggang Pe* and *Tajug* forms were rarely used for residences, with 90% of respondents noting their application in temporary structures or religious buildings, respectively. Among newer houses, 60% of homeowners opted for complex *Pelana* variants or hybrid forms, driven by increased economic mobility and access to advanced construction techniques. Conversely, 30% of respondents with limited budgets selected simpler *Pelana* roofs, often based on builders' recommendations tied to house layouts. This shift reflects a democratization of roof forms, where social hierarchies are less rigid, consistent with the informal nature of vernacular architecture (Suharjanto, 2011). However, 20% of homeowners noted a social stigma against traditional forms like *Joglo*, perceived as costly or outdated, indicating a societal preference for practicality.

Environmental considerations, such as climate and resource availability, have historically shaped vernacular roof designs (Nursaniah, Izziah and Laila Qadri, 2019). Older *Limasan* roofs, with steep slopes, were designed to manage heavy rainfall in Jepara's tropical climate, as noted by 75% of homeowners. Constructed from manually crafted clay tiles, these roofs were sustainable and locally sourced, aligning with Mentayani's (2012) emphasis on local materials. Newer roofs, however, incorporate factory-produced clay, zinc, or composite materials, with 55% of homeowners citing their durability and lower maintenance costs. The shift to *Pelana* roofs, noted by 50% of respondents, is attributed to their compatibility with modern materials and simpler construction. Yet, 35% of homeowners reported that these materials are less effective at heat insulation compared to traditional clay tiles, potentially compromising thermal comfort. Additionally, the complex forms of newer roofs, observed in 40% of cases, may reduce rainwater efficiency compared to the steeper slopes of *Limasan* roofs, raising concerns about environmental suitability.

The interplay of these factors is evident in homeowners' decision-making. For instance, while cultural pride drove the use of *Wuwung* in older houses, social and economic pressures in newer houses prioritize cost and trend-driven aesthetics, often at the expense of environmental performance. Interviews underscored that 70% of

newer homeowners prioritize functionality and affordability over traditional forms, reflecting a pragmatic adaptation to modern needs. However, 30% of all respondents advocated for preserving traditional roof forms, citing their cultural and environmental benefits, suggesting a community awareness of the need to balance modernization with heritage.

CONCLUSIONS

The study of vernacular roof typologies in Slagi Village, analyzed through the categories of geometry, material, and ornament, reveals a significant evolution in Javanese vernacular architecture driven by cultural, social, and environmental dynamics. By classifying five typologies—*Panggang Pe*, *Pelana*, *Limasan*, *Joglo*, and *Tajug*—this research elucidates the shift from traditional to modern forms and underscores the tension between adaptation and cultural preservation.

In older houses (>100 years), *Limasan* roofs dominate (80%), characterized by a robust four-plane geometry optimized for Jepara's heavy rainfall, as noted by 75% of homeowners. Constructed with handmade clay tiles and adorned with *Wuwung* ornaments in 70% of cases, *Limasan* roofs reflect middle-class cultural pride and social aspirations, avoiding the elite *Joglo* form (Sardjono, 2022). *Pelana* roofs, found in 10% older houses, feature simpler two-plane geometry without *Wuwung*, associated with lower-class status. *Panggang Pe*, present in 10% as terrace extensions, employs minimalist single-slope geometry, while *Joglo* and *Tajug* are absent in residential contexts, reserved for sacred or noble non-residential structures due to their complex geometries and high costs.

Newer houses (<25 years) exhibit a marked shift toward *Pelana* roofs (95%), frequently in hybrid forms used as terraces, leveraging cost-effective two-plane geometry and modern materials like factory-produced clay or zinc, cited by 55% of homeowners for durability. *Limasan* persists in 30% of newer houses, often in hybrid forms, but lacks *Wuwung*, signaling a move toward form-driven aesthetics influenced by global architectural trends accessed online (65% of respondents). *Panggang Pe* increases to 45% as carport extensions, reflecting practical adaptations, while *Joglo* and *Tajug* remain exclusive to mosques or government buildings, as noted by 90% of respondents, due to their cultural and economic exclusivity.

The prevalence of *Pelana* roofs and modern materials in newer houses reflects a democratization of forms, diminishing traditional social hierarchies, with 30% of homeowners choosing simpler *Pelana* roofs due to budget constraints. However, the absence of *Wuwung* in newer *Limasan* roofs and the use of zinc, reported by 35% as less effective for heat insulation, highlight environmental trade-offs and a potential loss of Javanese cultural identity, with 25% of homeowners expressing concern over the decline of traditional forms like *Limasan* and *Joglo*.

The classification based on geometry, material, and ornament provides a robust framework for understanding these shifts and emphasizes the need to balance modernization with heritage preservation. To safeguard Javanese vernacular architecture, stakeholders should promote the use of sustainable materials, such as

clay tiles, and support traditional craftsmanship through community education and incentives. This study underscores the critical role of documenting vernacular roof typologies to preserve cultural heritage while accommodating contemporary needs, ensuring that future generations inherit the rich architectural legacy of Slagi Village.

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