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Seri Iskandar Campus, Perak, MALAYSIA



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SIMPORA XVI: 2025**

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Alamat:

Unit Penerbitan UiTM Perak,
Pejabat Jaringan Industri, Masyarakat dan Alumni (PJIMA)
Universiti Teknologi MARA, Perak Branch,
32610 Seri Iskandar Perak, Malaysia.

05-3742716

uitmperakpress@gmail.com

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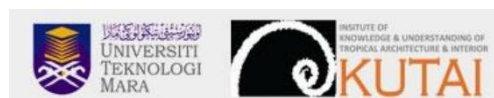
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REVISITING JALEPANG IN SASAK ALANG HOUSES: STRUCTURAL SIGNIFICANCE, TRADITIONAL TECHNIQUES, AND CULTURAL PRESERVATION

Ivan Fachrul Marsa^{1*}, Andi Abidah², Alexander Adrian Saragi³

^{1,2,3} Architecture Study Program, Department of Civil Engineering and Planning Education,
Faculty of Engineering, Universitas Negeri Makassar

Corresponding Author: ivan.fachrul.marsa@unm.ac.id*

Abstract: Vernacular architecture in Indonesia integrates indigenous engineering, ecological adaptation, and symbolic meaning, with the Sasak community's Rumah Alang in Lombok exemplifying this synthesis. This study examines the jalepang, a structural and symbolic component, to analyze its craftsmanship, cultural role, and sustainability relevance as a nexus of material practice and identity. A qualitative descriptive design within architectural ethnography was employed, combining field observation, semi-structured interviews, participatory documentation, and comparative analysis. Data were thematically analyzed to identify recurring patterns of craftsmanship, symbolic narratives, and ecological strategies. The findings reveal that the jalepang serves dual functions: structurally, it redistributes vertical loads and enhances resilience to seismic activity through mortise-tenon joinery without industrial fasteners; ecologically, it provides passive pest control by deterring rodents, thereby reducing dependence on chemicals; symbolically, it represents cosmological dualism, agrarian prosperity, and communal pride. Although ritual meanings are waning, contemporary reinterpretations preserve its relevance within heritage branding and tourism. The study concludes that the jalepang is not a marginal detail but a multidimensional element integrating engineering ingenuity, ecological pragmatism, and cultural symbolism. As a living prototype, it offers methodological insights for sustainable design, eco-heritage preservation, and disaster-resilient architecture, underscoring the ongoing value of indigenous knowledge.

Keywords: Vernacular Architecture, Sasak, Jalepang, Craftsmanship, Symbolism, Sustainable Design

INTRODUCTION

Vernacular architecture in Indonesia embodies not only traditional construction methods but also cultural values, ecological adaptation, and social identity. Within this diverse architectural landscape, the *Rumah Alang* of the Sasak people in Lombok represents a distinctive architectural heritage that integrates functionality with cultural symbolism. As previous studies note, traditional Sasak dwellings are deeply intertwined with local belief systems, agricultural practices, and communal resilience (Hidjaz et al., 2019). These structures reflect indigenous engineering strategies designed to withstand environmental conditions such as tropical climates and seismic activity while simultaneously preserving cultural meaning. (See Figure 1)



Figure 1. *Rumah Alang* of the Sasak People

Recent scholarship has increasingly recognized the ecological and cultural dimensions of Sasak vernacular settlements. For example, Wahyudi and Wikantiyoso (2021) emphasized how *bale tani* and other architectural forms in East Lombok demonstrate local wisdom in resource use and conservation. Similarly, Arief and Subadyo (2017) argued that Sasak settlements embody the principles of *ecovillage sustainability*, integrating ecological balance, social cohesion, and cultural continuity. Such studies underscore the relevance of indigenous architecture to contemporary discussions on sustainability and resilience. However, these works have largely focused on the settlement as a whole, the overall layout, or broader cultural symbolism, with less attention given to specific structural components that ensure both functionality and cultural persistence.

One such element is the *jalepang*, a circular wooden disk placed around the barn's stilts to prevent rodents from reaching the rice storage while reinforcing structural stability. Despite its modest size, the *jalepang* plays a pivotal role in ensuring food security and in sustaining the symbolic protection of the *Rumah Alang*. Yet, scholarly attention to the *jalepang* remains limited. Most studies reference it only in passing, without a detailed examination of its structural role, craftsmanship, and cultural meaning. This constitutes a clear research gap: while vernacular architecture has been examined as a holistic entity, micro-level elements such as the *jalepang*—where engineering, ecology, and culture intersect—remain underexplored.

Addressing this gap, the present study revisits the *jalepang* as a key structural and cultural feature of Sasak rice barns. The novelty of this research lies in its dual analytical perspective: it examines the *jalepang* both as an indigenous engineering solution adapted to local ecological challenges and as a cultural symbol embedded in Sasak heritage. By combining structural analysis with cultural interpretation, this study contributes not only to architectural scholarship but also to the discourse on sustainable heritage preservation.

Accordingly, the aim of this study is to analyze the structural significance, traditional techniques, and cultural meaning of the *jalepang* in Sasak *Rumah Alang*. Specifically, it seeks to (1) document the craftsmanship and construction techniques of the *jalepang*, (2) interpret

its symbolic role within Sasak cultural identity, and (3) evaluate its relevance to contemporary sustainable design practices. In doing so, this research addresses the urgent need to safeguard micro-level vernacular knowledge systems and integrates indigenous wisdom into modern architectural discourse.

2. LITERATURE REVIEW

2.1 Sasak Vernacular, Rumah Alang, and Jalepang: Typology, Ecology, and Meaning

Sasak vernacular architecture embodies the convergence of agrarian practice, belief systems, and ecological strategy, with the *Rumah Alang* (rice barn) serving as a central icon for grain circulation and communal identity (Saharuddin, 2019). Typological studies demonstrate consistency in spatial patterns, thatched roofing, and elevated four-post structures that protect against humidity and pests (Wirata & Sueca, 2014). Within this context, the *jalepang*, a circular wooden disk attached to barn posts, operates as a micro-technology that prevents pests and frames the barn as a cultural and agricultural asset (Susilo et al., 2020). Beyond functional aspects, barns have been interpreted as socio-spatial regulators of rice production and distribution (Suranto, 2013), while their form continues to influence contemporary Indonesian architectural design.

Global heritage frameworks emphasize the importance of conserving wooden elements and craftsmanship essential to Sasak barns. Scholar reports underline the transmission of vernacular knowledge as a condition for sustaining construction traditions (Priavolou et al, 2021). In Nusa Tenggara, post-disaster documentation presents vernacular practices as contributors to resilience (Rico, 2020). Despite this recognition, most studies remain focused on barns as macro-typological artifacts, leaving micro-elements such as the *jalepang* underexamined in terms of structural performance and symbolic meaning (Ravindran et al, 2019). This gap highlights the need for research that integrates micro-level analysis into broader discussions on food security, cultural heritage, and sustainability.

2.2 Wooden Construction, Seismic Resilience, and Conservation Frameworks

The 2018 Lombok earthquake showed that many Sasak vernacular buildings demonstrated resilience due to traditional wooden joinery and the flexibility of natural materials (Sasongko et al., 2020). Experimental research on joinery in bale houses in Desa Sade confirmed ductile behavior and favorable redistribution of forces under cyclic lateral loading thereby supporting capacity-based design principles for timber structures (Susanthi et al., 2022). A recent systematic review identified determinants of seismic resilience in vernacular architecture including lightweight geometry elastoplastic joinery, redundancy and sustained material care (Shareef, 2023). Documentation of vernacular settlements such as Shende reaffirmed the continuity of craftsmanship climate adaptation and community participation as pillars of resilience while prototypes of bamboo-based temporary housing in Lombok reformulated local lessons for rapid assembly affordability and sustainability (Shende, 2023). At the policy level studies cautioned against reducing the rice barn form to branding without transmitting its embedded construction know-how.

Normative conservation frameworks emphasize the importance of timber conservation and the expertise of local artisans for preserving vernacular heritage (Akturk, 2020). In Lombok cultural approaches to Build Back Better demonstrated how traditional practices can coexist with modern safety standards suggesting pathways for developing inspection and maintenance protocols for *jalepang*. Despite these frameworks research has not yet provided standardized measurements of *jalepang* performance such as shear and tensile capacities at

the post joint susceptibility to biological degradation or failure modes under lateral loading. Comparative studies of *jalepang* morphology and maintenance practices remain scarce despite the emphasis in vernacular seismic literature on performance-based evaluation. This study therefore addresses that gap by integrating field observation material testing and structural appraisal within the framework of timber conservation guidelines and cultural heritage agendas aiming to analyze the structural technical and cultural significance of *jalepang*.

3. METHOD

3.1 Research Design

This study employs a qualitative descriptive approach within the framework of architecture ethnography (Kaijima & Stalder, 2018). This approach was chosen because the primary focus of the research is to explore the structural significance, traditional techniques, and cultural values embedded in the *jalepang* as a vital element of the Sasak *Rumah Alang*. Architectural ethnography enables the researcher not only to document the physical form and construction techniques, but also to interpret the symbolic values and sociocultural functions associated with them. In this way, the research goes beyond the material dimension and embraces the immaterial aspects of local knowledge and traditional wisdom. This approach is relevant to the objectives of the study, namely to document construction techniques, to interpret the symbolic role of the *jalepang* in Sasak cultural identity, and to evaluate its relevance to contemporary sustainable design practices. Such research requires in-depth exploration, direct engagement in the field, and interpretive analysis of cultural meaning, which methodologically align with a qualitative paradigm.

3.2 Research Object

The primary object of this research is *jalepang*, a structural and symbolic element of the Sasak community's *Rumah Alang* (traditional stilt house). *Jalepang* is not merely understood as a component of architectural construction, but also as a representation of local knowledge that reflects cosmology, social systems, and ecological wisdom. The study specifically explores *jalepang* in its dual functions: as a physical structure and as a cultural symbol embedded within Sasak traditions. The research is situated in Lombok, West Nusa Tenggara, with a particular focus on Sasak customary villages where *Rumah Alang* traditions are still preserved. Key locations include Sade and Rambitan villages, both recognized as cultural centers of the Sasak community and as sites where traditional houses remain intact. These locations are selected based on the authenticity of their architectural forms and the continued vitality of local cultural practices, thus providing a contextually rich environment for examining *jalepang* as a nexus of materiality and meaning.

3.3 Research Procedure

The research procedure of this study employs a qualitative ethnographic approach designed to capture the multifaceted significance of the *jalepang* in the Sasak *Rumah Alang*. Data collection integrates several complementary strategies: (1) field observation, which involves direct engagement with the architectural sites to document the physical structure, spatial orientation, and material composition of the *jalepang*; (2) semi-structured interviews with local craftsmen, elders, and community members to gather narratives on traditional construction techniques, craftsmanship values, and symbolic interpretations embedded within the *jalepang*; (3) participatory documentation, wherein the researcher records

construction processes, rituals, and craftsmanship practices through photography, sketching, and detailed field notes; and (4) textual and comparative analysis, which situates local knowledge within broader vernacular architectural studies and sustainable design discourses. The data are analyzed using an interpretive framework that interweaves structural analysis, symbolic anthropology, and sustainable architectural theory, allowing the *jalepang* to be understood not merely as a physical component of the *Rumah Alang*, but as a cultural signifier that embodies Sasak identity, ecological wisdom, and resilience. Through this methodology, the study ensures a holistic understanding that bridges indigenous architectural practices with contemporary sustainability paradigms.

3.4 Research Analysis

The collected data were analyzed using thematic and interpretive techniques, with a focus on identifying recurring patterns of craftsmanship and symbolic meaning embedded in the *jalepang*. Interview transcripts were systematically coded to capture themes related to cultural symbolism, traditional continuity, and local knowledge transmission, while visual documentation such as photographs and sketches was cross-referenced with these narratives to ensure contextual accuracy. This triangulated approach not only enhanced the validity and reliability of the findings but also provided a holistic understanding of the *jalepang* as both an architectural feature and a cultural symbol, aligning with Creswell and Poth's (2018) framework for qualitative data analysis.

4. RESULT

4.1 Craftsmanship and Construction Techniques of the *Jalepang*

The field documentation and ethnographic observation highlight that the *jalepang* is not merely a secondary accessory within the *Rumah Alang* but a pivotal architectural device designed with sophisticated indigenous engineering logic. Functionally, it is a circular wooden disk positioned between the supporting posts (*penyangga*) and the raised floor beams, serving a dual purpose: (1) structurally, it regulates the transmission of vertical loads from the barn chamber into the posts, minimizing uneven stress distribution, and (2) ecologically, it acts as a pest-prevention technology by obstructing rodents and insects from accessing the grain storage. This duality—structural and protective—exemplifies the convergence of technical ingenuity and agrarian necessity in Sasak vernacular architecture.

The construction process is guided by principles of precision joinery and material selection. Traditional artisans employ interlocking systems such as mortise–tenon joints, avoiding nails or modern fasteners, thereby maintaining elasticity under dynamic stresses such as wind and earthquakes. The *jalepang* itself is typically carved from dense hardwood species including teak (*Tectona grandis*), jackfruit (*Artocarpus heterophyllus*), or tamarind (*Tamarindus indica*), chosen for their high compressive strength, termite resistance, and longevity. Crafting requires symmetrical carving with meticulous alignment to ensure uniform load distribution and tight interfacing between the disk and the wooden posts. Oral transmission of these methods across generations reinforces not only technical mastery but also the cultural continuity of Sasak carpentry. (See Figure 2).



Figure 2. The structure of *Jalepang*

Ecological pragmatism is evident in the practice of utilizing local resources with minimal waste. Timber is sourced from community-managed forests, while plant-based fibers or rattan ties are used for binding, ensuring biodegradability and reducing reliance on external materials. The dimensions of the *jalepang*—diameter, thickness, and curvature—are proportionally adapted to the barn’s scale, reflecting an embedded architectural logic that harmonizes micro-elements with the overall typology of the *Rumah Alang*. The craftsmanship thus embodies a sustainable vernacular approach where structure, ecology, and symbolism converge in a single architectural component.

Table 1. Structural and Craftsmanship Characteristics of the *Jalepang*

Aspect	Description
Form	Circular wooden disk, slightly convex profile
Position	Intermediary joint between posts (<i>penyangga</i>) and floor beams
Structural Function	Redistributes vertical loads; stabilizes superstructure
Ecological Function	Prevents rodents/insects from climbing into grain storage
Material Selection	Teak, jackfruit, or tamarind wood; dense, termite-resistant, high compressive strength
Joinery Technique	Mortise–tenon and interlocking joints; no nails; rattan/plant fiber binding
Craftsmanship Features	Symmetrical carving; precision alignment of load-bearing points
Ecological Adaptation	Locally sourced timber; biodegradable binding materials; resource efficiency
Cultural Transmission	Oral knowledge passed across generations; embedded in Sasak carpentry tradition

The findings affirm that the *jalepang* operates at the intersection of engineering, ecology, and culture. Structurally, it exemplifies vernacular principles of load transfer and resilience without reliance on industrial fasteners. Ecologically, its pest-prevention role and reliance on locally available hardwoods demonstrate adaptive strategies grounded in resource

pragmatism and environmental stewardship. Culturally, the oral transmission of joinery techniques situates the *jalepang* as a vessel of collective memory, reinforcing continuity within Sasak carpentry traditions. The integration of these dimensions reveals that the *jalepang* is not an isolated architectural detail but a holistic design element embodying indigenous wisdom. This synthesis underscores its relevance to contemporary architectural discourse, where structural efficiency, sustainability, and cultural embeddedness are increasingly recognized as inseparable dimensions of resilient design.

4.2 Symbolic Role of the *Jalepang*

The ethnographic narratives revealed that the *jalepang* transcends its physical role as a pest-preventive device by embodying layers of symbolic significance within Sasak cosmology. Community elders consistently emphasized its function as a boundary marker between the cultivated (rice storage) and the uncultivated (pest intrusion), a metaphor that resonates with broader Sasak dualistic worldviews distinguishing purity from impurity, order from chaos, and prosperity from threat. Ritual accounts indicate that the installation of the *jalepang* is often accompanied by prayers and offerings, signifying its role as a mediator between human agency and natural forces.

At the social level, the *jalepang* is interpreted as a material expression of collective identity. Oral traditions suggest that barns lacking properly carved or proportioned *jalepang* are considered incomplete, undermining the communal pride of the settlement. Symbolic readings by younger generations, however, reveal a shift: while elders foreground ritual and cosmology, youth increasingly perceive the *jalepang* as a cultural emblem suitable for reinterpretation in tourism branding and creative design. This intergenerational divergence reflects both continuity and transformation of meaning. (See table 2)

Table 2. Symbolic Dimensions of the *Jalepang*

Dimension	Traditional Interpretation	Contemporary Perception	Cultural Implication
Cosmological Boundary	Divider between purity and impurity	Largely forgotten or ritualized in festivals	Reflects resilience of symbolic dualism
Agrarian Prosperity	Protection of rice as symbol of life and sustenance	Seen as heritage emblem rather than ritual tool	Potential dilution of agrarian symbolism
Social Identity	Marker of communal pride and authenticity	Used in tourism logos, design motifs	Shifts from functional pride to symbolic branding
Ritual Significance	Installed with offerings and prayers	Rituals less frequently observed	Indicates erosion of ritual practice

The symbolic role of the *jalepang* reveals a dynamic interplay between tradition and modernity. While its cosmological and ritual meanings remain embedded in the narratives of

elders, contemporary reinterpretations tend to prioritize aesthetic and emblematic values, aligning with cultural commodification and heritage tourism. This divergence illustrates the adaptive nature of vernacular symbols: their survival does not necessarily depend on static ritual practice but on their capacity to be re-signified across contexts. Consequently, the *jalepang* emerges as both a sacred mediator within Sasak cosmology and a versatile emblem within contemporary cultural identity, demonstrating the fluidity of vernacular symbols in negotiating resilience, relevance, and recognition in a changing world

4.3 Relevance to Contemporary Sustainable Design Practices

The analysis indicates that the *jalepang* embodies principles highly relevant to contemporary sustainable design discourses. Its reliance on locally sourced timber and plant-based binding materials highlights resource circularity and low embodied energy. Unlike industrial fasteners, the interlocking wooden joints allow disassembly, reuse, and repair, aligning with circular economy models. Field observations further revealed that the tactile knowledge of proportion and placement, transmitted orally by Sasak craftsmen, has produced structural resilience under dynamic loads, offering lessons for performance-based sustainable engineering. (See Table 3)

From an environmental perspective, the *jalepang* contributes to passive pest control by elevating and separating stored rice from external threats, thus minimizing reliance on chemical-based protection. This ecological logic mirrors present-day advocacy for design solutions that work with, rather than against, natural systems. In socio-cultural terms, the *jalepang* integrates material efficiency with symbolic depth, making it a precedent for design practices that emphasize cultural continuity alongside sustainability. Comparative reflections with green building frameworks such as *vernacular bio-design* and *eco-heritage approaches* show that *jalepang* practices can inform strategies of resilience and adaptability in rural and peri-urban contexts.

Table 3. Sustainable Design Principles Reflected in the *Jalepang*

Sustainability Dimension	<i>Jalepang</i> Practice	Contemporary Parallel	Design Implication
Material Circularity	Use of local timber and fibers, no metal fasteners	Circular economy and cradle-to-cradle design	Promotes low-carbon, repairable, reusable systems
Structural Adaptability	Interlocking joints with ductile behavior	Performance-based seismic design	Enhances resilience in disaster-prone regions
Ecological Integration	Passive pest control through elevation/barrier	Biophilic and regenerative design	Reduces dependence on chemicals, fosters ecology
Cultural Continuity	Embedded symbolism in construction practice	Eco-heritage, culturally embedded sustainability	Ensures relevance of indigenous knowledge systems

The findings demonstrate that the *jalepang* is more than a static relic of vernacular architecture; it represents a living prototype of sustainable practice rooted in indigenous wisdom. Its ecological pragmatism, structural adaptability, and symbolic integration provide

a multidimensional framework that resonates with contemporary concerns in green architecture and disaster-resilient design. Rather than treating it solely as cultural heritage, the *jalepang* should be positioned as a source of methodological innovation in architectural sustainability. In this sense, safeguarding and recontextualizing *jalepang* knowledge is not only an act of cultural preservation but also a pathway for developing context-sensitive, low-impact, and culturally grounded design futures.

5. DISCUSSION

The results of this study demonstrate that the *jalepang* is a multidimensional architectural element combining structural, ecological, and cultural functions. Its craftsmanship, based on interlocking timber joints and pest-preventive design, illustrates how indigenous engineering logics provide resilient and sustainable solutions without industrial fasteners. Similar findings are reflected in recent research on vernacular timber construction across Southeast Asia, which highlights the durability and adaptability of joinery systems in earthquake-prone environments (Muqoffa et al., 2024; Bredenoord, 2024). Comparative studies of Sasak bale houses also show that ductile behavior in mortise–tenon systems allows redistribution of seismic forces, aligning with principles of modern capacity-based design (Hadi et al., 2021). These convergences suggest that *jalepang*'s structural role resonates with contemporary concerns in disaster-resilient architecture.

Beyond its structural logic, the *jalepang* operates as a vernacular pest-prevention mechanism, reflecting ecological pragmatism. By physically obstructing rodents and insects from accessing rice storage, it reduces dependence on chemical interventions. This aligns with eco-design practices that prioritize passive ecological integration over technological fixes (Knight, P., & Jenkins, 2009). Recent work on bamboo-based housing prototypes in Lombok similarly shows that local material intelligence can provide low-cost, sustainable, and ecologically sensitive alternatives for post-disaster reconstruction (Fajrin et al., 2021). The *jalepang* thus represents a vernacular form of bio-design, merging environmental adaptation with architectural ingenuity.

The symbolic and cultural significance of the *jalepang* highlights its role as a boundary object between cosmological, agrarian, and social realms. Elders interpret it as a divider between purity and impurity, echoing Sasak dualistic cosmology. Such findings resonate with broader studies on intangible heritage in vernacular architecture, where structural elements also function as carriers of meaning (Ozel et al., 2014). However, younger generations tend to reinterpret the *jalepang* as a cultural emblem for tourism and branding, reflecting the commodification of heritage (Verances et al., 2024). This duality underscores how vernacular symbols survive not only through ritual continuity but also through adaptive re-signification across modern cultural economies.

From a sustainable design perspective, *jalepang* practices embody principles of material circularity, resilience, and cultural continuity. Its reliance on locally sourced timber and biodegradable bindings aligns with the circular economy discourse in contemporary green architecture (Yuliani & Hardi, 2024). Moreover, its capacity for repairability and modular disassembly parallels regenerative design models applied in modern timber engineering (McKinney, 2025). As demonstrated in global research on timber conservation (Xu, 2024), integrating traditional joinery into modern frameworks ensures not only low-carbon construction but also the continuity of intangible knowledge systems.

At the intersection of local knowledge and global sustainability, the *jalepang* can be considered a prototype for context-sensitive architectural innovation. Comparative

reflections with indigenous structures in Bali and Toraja reveal similar strategies of integrating ecology, resilience, and symbolism into timber construction (Dwijayanthi et al., 2017; Lee & Ostwald, 2019). These convergences suggest that indigenous micro-elements like *jalepang* should not be studied as static relics but as living laboratories of knowledge with methodological relevance for contemporary architecture. Protecting and recontextualizing such elements can enrich modern design practice with cultural depth and ecological intelligence.

Despite its contributions, this study has several limitations. First, the analysis relied primarily on field documentation and ethnographic interpretation, which may not fully capture the mechanical performance of *jalepang* under dynamic seismic loading. Future research should integrate structural simulation and laboratory testing to establish standardized metrics of shear, tensile, and compressive capacities. Second, the cultural interpretations reflect the perspectives of selected communities in Lombok; comparative ethnographic studies across different Sasak settlements may reveal additional symbolic variations. Finally, the integration of *jalepang* knowledge into contemporary sustainable architecture requires experimental design applications, testing its adaptability in urban and peri-urban contexts. Addressing these gaps will strengthen the dialogue between vernacular heritage and future-oriented architectural innovation.

6. CONCLUSION

The study reveals that the *jalepang* is a multidimensional architectural element within Sasak *Rumah Alang* that integrates structural ingenuity, ecological pragmatism, and cultural symbolism. As a crafted circular wooden disk employing mortise–tenon joints and dense local hardwoods, it regulates load transfer while simultaneously preventing pest intrusion, exemplifying the convergence of engineering resilience and agrarian necessity. Its craftsmanship—rooted in precision joinery, resource efficiency, and oral transmission—demonstrates how indigenous practices embody sustainable principles long before modern frameworks such as circular economy and performance-based seismic design were articulated. Beyond its material logic, the *jalepang* embodies symbolic and cultural depth, functioning as a boundary between purity and impurity, prosperity and threat, while serving as a marker of communal pride. Although ritual interpretations are waning, contemporary reinterpretations sustain its relevance through heritage branding and design motifs. These shifting meanings highlight the adaptability of vernacular knowledge systems. Collectively, the structural, ecological, and symbolic roles of the *jalepang* affirm its importance not only as intangible heritage but also as a living prototype for sustainable design, offering context-sensitive strategies for disaster resilience, eco-design, and culturally embedded architectural innovation.

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