

Design Methods of Vernacular Architecture: Insights from *Ngundagin* by *Undagi*: Bali, Indonesia

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Abstract

This research examines the Balinese *undagi* vernacular design method called *ngundagin* as an inspiration and reinforcement of contemporary designers' understanding of vernacular design as a process and relationship between the designer and the design object. It thus formulates a design method that can be employed by the Balinese *Undagi* – the traditional architect of Bali vernacular architecture, namely *ngundagin*, to preserve the authentic Balinese vernacular architecture through his practice. *Undagi* is a Balinese vernacular architect whose existence has been recorded since 882 AD and whose condition is getting decadent.

The research uses a multidisciplinary systematic literature survey that qualitatively analyses academic records and traditional manuscripts on the design-built stages of Balinese vernacular architecture performed by *Undagi*. The results are analyzed through the lexicometric method to find the same terms from various works of literature with a diversity of terms in the *ngundagin* stage. The literature data is then triangulated and reorganized to get a general pattern of the *ngundagin* method. The triangulation process uses traditional scriptural sources (*lontar*), academics interviews, and contemporary *Undagi* to understand the vernacular architectural design process in the field textually and practically.

The findings reveal that Balinese vernacular architecture symbolizes cosmic beings that will coexist harmoniously with their inhabitants. They show that the *ngundagin* method as the design built stage of Balinese *Undagi* in designing vernacular architecture in Bali consists of three main stages: pre-construction, construction, and post-construction. The *ngundagin* method shows the correlation between the *Undagi*'s worldview in Bali vernacular architecture as the final result of their design.

Keywords: Undagi Bali, Bali vernacular architecture, Ngundagin method, Vernacular architecture, Cultural Preservation

Introduction

Bali, a province in Indonesia has gained global recognition for its cultural tourism (Antara & Sumarniasih, 2017). Vernacular architecture of Bali is widely recognized as a significant feature, serving as a model for the advancement of cultural tourism in tropical environments globally (Putra *et al.*, 2023). Therefore, the preservation of Balinese vernacular architecture in the face of international influence in global tourism has been subject to misconceptions in the context of urban developments in Bali (Cuthbert, 2012). Moreover, it has been observed that vernacular architectural designers have ceased to participate in the process of urban infrastructure developments in Bali (Achmadi, 2016; Pranajaya, Suda & Subrata, 2020; Dwijendra & Adhika, 2022).

The 'designers' of vernacular architecture in Bali are called *undagi*, whose existence has been recorded since 882 AD (Goris, 1954). Today, the *Undagi* population has declined in numbers and qualifications, causing Balinese architecture to experience a crisis of local spirit. This duty of defense of spiritual values in Balinese architecture is gradually diminishing in modernity due to modern building permit practices (Wirjomartono, 2014). Therefore, due to its strategic position, it is deemed necessary to explore the vernacular architectural design methods of Balinese *Undagi* as a pilot project to help the other vernacular architects in the other regions of the world.

Undagi, in their vernacular design-build practice, traditionally adheres to the design-build stages as guided by the traditional architectural manuscripts. In the ancient manuscripts entitled Babad Pasek Kayu Selem (Wardha, 1989) and Whraspati Tattwa (Bajra, 2016), the term "ngundaginin," was found which means 'practicing to be an *Undagi*' (Noorwatha *et al.*, 2023). It implies a Balinese version of vernacular architectural design method. On initial observations in the field through interviews with contemporary *Undagi*, designers, architects, academics, culturists, religionists, and authorities, the tradition of *Undagi* in Bali has long been disconnected; hence, the vernacular design method needs to be revised. Moreover, the methods in the field are fragmentary and elusive (Macrae & Parker, 2002; Achmadi, 2016).

In this context, this research examines a traditional Balinese vernacular architectural design method called *ngundaginin*, as a design process for the creation of Balinese vernacular architectural designs. The discovery of the *ngundaginin* method as a design process is an effort to preserve the culture-based design process as part of the heritage of Balinese architectural tradition.

The objectives of this study are:

- To unravel the architectural design of Balinese *Undagi*, specifically focusing on *ngundaginin*,
- To facilitate the safeguarding the traditional design principles and practices of Balinese vernacular architecture.
- To produce sources of inspiration for current designers in their perception of design as a dynamic process and the interplay between the designer and the design object.

Hence, this study makes a valuable contribution by elucidating the manner in which the Balinese *Undagi* vernacular architectural design method, known as *ngundaginin* is practiced.

Vernacular Architectural Design Method: A Theoretical Basis

A design method refers to a systematic and acknowledged sequence of activities that are iteratively undertaken to achieve a given goal within the architectural design process. As Plowright (2014) states, the proposed methodology possesses the capacity to provide architectural outcomes in which all participants and procedures can be comprehended, acquired, and implemented by future practitioners. Modern architectural production techniques follow technical rules, which are essential to the scientific discipline of architecture. In fact, technical standards may be an innovative way to socially govern technology. On the other hand, Mitcham (2005) criticizes that these standards typically reflect technological ideals and behaviors. The above institutions amplify self-centred needs of the material fabricators, building techniques of the corporate contractors, and the risk evaluations of insurance firms.

In the context of vernacular architecture, the sequential phases of architectural production deviate from conventional 'modern' design methodologies. The production process of vernacular architecture fosters an alternative perspective on the interpretation of 'design' and the fabrication of material culture.

The prioritization of production concerns and the conviction that the true significance of a structure lies only in the intentions of its creator during the construction phase has undeniably contributed to the development of the notion of vernacular architecture (Vellinga, 2011). Understanding historic buildings and skills is essential to revitalizing vernacular building forms. Identifying, understanding, and creating thorough inventory of vernacular structures and its makers, especially skilled artisans, is crucial. The endeavour also requires documenting, classifying, and distributing data on the basic features, structural arrangements, constituent components, and production procedures of vernacular structures (Thakkar & Routh, 2019).

Architectural academics must possess an understanding of vernacular builders, who also function as vernacular designers. The primary focus of scholars in the field of vernacular architecture often is on the examination of structures. This concentration is sometimes attributed to the limited availability of information regarding the builders of these projects, who are either unknown or deceased. Consequently, there exists a dearth of data pertaining to the design capabilities possessed by these vernacular architects (Hubka, 1979). However, it is widely held among the scholars that design is commonly associated with the skill of draftsmanship, and that designers employ drawing skills as a distinctive aspect of the design development process.

Klaus Kripendorff (1989) traces the meaning of the word 'design' back to "de+signare," as 'something that depicts a sign'; Guy Julier (2000) derives the contemporary interpretation of the term 'design' from the Renaissance term 'designo,' which refers to 'the individual responsible for sketching a fresco, subsequently painted by another person'. Guy Julier suggests that the division between the act of sketching the design and the subsequent execution of the fresco, with a separate individual responsible for painting, signifies the inherent dichotomy between planning and implementation, a fundamental attribute of design.

Designers generate plans, blueprints, or specifications that are subsequently executed by others (Cruickshank, 2016). The vernacular builders on other hand refrain from utilizing drawings in their profession. However, they possess deliberate intents and rationales for their actions. These include fostering social ties, cultivating aesthetics, establishing an environment conducive to particular home lifestyles, and adapting to emerging cultural ideals. Similar to a designer with a refined sense of aesthetics, a vernacular builder needs a clear vision and the necessary skills to accomplish it (Domer, 1989).

The design process adheres to a consistent pattern. Majority of practical designs exhibit a tiresome and seemingly different and subjective nature. However, it is important to note that most designs adhere to a consistent underlying pattern, known as the design technique, which may be employed consciously or unconsciously (Gregory, 1966). Design practice as a creative process of each designer in producing the final design product (end product) is certainly different and personal. Thus, the academics and researchers in the field of design are trying to formulate design methods by analysing and synthesising methods in design practice (Cross, 1984).

A design methodology addresses a specific category of problems: Establishing a connection between the product and the given context in order to meet the needs and desires of its users (Gregory, 1966). The utilization of patterns aids in the identification and formalization of recurring sequences of occurrences within the design process. The identification of patterns can be facilitated through the use of a transparent system aimed at promoting conservation throughout the community. The implications of utilizing vernacular design methodologies can provide valuable insights and contributions.

- (1) It is imperative to maintain and safeguard cultural identity and unique characteristics of urban patterns.
- (2) The application of the design process involves an exploration of the language of patterns.
- (3) The evaluation of different conservation communities within a given community is conducted, and guidelines are provided for future development or expansion.

- (4) The generalization of the language of patterns is extended to communities that share similar cultural dimensions.

Therefore, it is imperative to conduct a re-evaluation of the occurrence patterns in current variables in order to establish an appropriate framework for modern operations (Abdel-Azim & Osman, 2018).

Review of Literature

From colonial times to today, Indonesian architecture schools have taught European architecture. These schools' curricula deepen the gap between modern architecture and vernacular building techniques. Thus, Indonesia's vernacular architecture may disappear (Gunawan, 2012). *Undagi*, Bali's vernacular architects, are suffering decadence as modern architectural progress uses Balinese identity to support cultural tourism (Wiryomartono, 2014; Achmadi, 2016; Pranajaya, Suda & Subrata, 2020; Dwijendra & Adhika, 2022). Another Indonesian vernacular architect, *Tukang rumoh* in Aceh Province (Nas, 2003; Herman, 2018), *Sanro bola* or *Panrita bola* to the *Bugis* tribe in South Sulawesi Province (Robinson, 2005), *Tukang tuo* in West Sumatra (Fitriza, 2018; Rini, Numan and Idham, 2021). *Kuncen* from Kampung Naga-Tasikmalaya and Kampung Dukuh, Garut-West Java Province (Rosyadi, 2015), *Tukang/pande* from Palu, Central Sulawesi Province (Rumagit, 2015), *Maelu Uma* from Sumba (Mross, 2000) and *Lima Padhe* from Ngada (Panjaitan, 2017)-East Nusa Tenggara Province, likewise exhibits decadence.

Paul Oliver (1986) asserts that energy conversion during building, knowledge acquisition and skill transfer, and values affect efficiency and performance—these questions concern technology or "vernacular know-how" in general. Bronner (2012) states that vernacular buildings rely on traditions for validity and social significance. Unwritten or subconscious behaviors that promote variations are called 'norms' instead of 'rules.' A tradition, especially a religious one, might have numerous interpretations. In fact, Rapoport (1969) says that vernacular design comes from established rules. This culture- and place-specific laws are widely accepted in a region, generating clear surroundings that communicate with their people and can be adapted to local conditions.

Aranha (1991) states that house architecture isn't lifeless in traditional communities. Vernacular societies believe architecture is born as "living beings". According to him, the construction process follows rituals similar to human formation. Oliver (1987) lists location finding and purification, foundation stone laying, ridge-beam setting, primary door orientation, building rituals, and house purification before moving in as vernacular architectural rituals. An astrologer or priest predicted each procedure's lucky time and connected auspicious places and times to the owner's success and prosperity.

Indeed, vernacular architectural 'design' processes involve spirituality and religiosity due to their proximity to rituals. Religions give architecture artifacts cultural values. These values affect the quality of architecture during the design, construction and post-construction processes (Arthana, 2020). Traditional architects are crucial to the design & build process, which incorporates intelligence, spirituality, structural logic, and cultural knowledge (Oliver, 1987). Vernacular architecture provides 'intelligence' rewards for the next generation of builders to acquire adaptability, resource optimization, and overcome the hurdles. It acknowledges the "meaning" of design, which has inspired a surprising cultural and social change by craftsmen, brickmakers, carpenters, and others, but most importantly by residents—the nameless builders (Guillaud, 2014).

Modern architecture is scientific and follows technical needs. Technical standards are an unexpected tool for social control over technology. Standards often reflect technological values and behaviors, unfortunately. They encourage self-serving demands of material fabricators, construction practices of the corporate contractors, and risk assessments of the insurance firms (Mitcham, 2005). Vernacular architecture does not follow 'modern' design methods. They redefine 'design' and 'creation' of material culture.

Balinese vernacular dwellings, from simple to ornate reflect a tradition influenced by Indian culture. Metaphysics-based notions, Hindu religious beliefs, cosmology, ritual, function,

and climate are included into Indian-influenced architecture. These factors affect building placement, design and purpose (Davison, 2014).

Undagi oversees Balinese vernacular house construction. They do carpentry, stone processing, and priestly responsibilities during building construction. They ceremonially liberate the natural elements of the earth, allowing human habitation. The palm leaf sacred scripture *lontar* Ashta Kosali, which describes building construction procedures, influences *Undagi*. In fact, according to Peters (2013) the *lontar* Ashta Kosali emphasizes homeowner-specific measurement and proportion.



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Fig. 1: Social community service build a temple in Bangli regency 2017
Source: Balipuspanews, 2017

The process of architectural construction involves the transformation of abstract concepts into tangible structures. The architectural tradition observed in Bali is commonly referred to as '*ngawangun*', a term derived from the Balinese word '*wangun*', denoting the act of creating an object that possesses both luminosity and a consistent form. The term '*wangun*' is also used to denote concepts such as structure, upright position, standing posture, form, and figure (Wirjomartono, 2014).

As an application of heavenly wisdom called '*tatwa*', '*ngawangun*' opens Nature to the truth of existence. The essential concepts of existence, such as '*dharma*' (virtue and duty), link '*ngawangun*' with '*tatwa*'. The term '*ngawangun*' also refers to self-identification within social boundaries. Since ceremonies and gifts are part of every mortal stage, '*ngawangun*' might be seen as setting new bounds and transitions. Moreover, labor hierarchy is another building tradition. The establishment of a socially appropriate environment is necessary to regulate ethics and morals. This involves social cohesion and individual absorption into community life. (Wirjomartono, 2014).

Vernacular architecture is always related to social events. Every architectural development as a complex process is a social event that involves many members of the community in a development. The vernacular building process in Bali always involves many people whether for the construction of public buildings that involve community participation (*ngayah*; *gotong royong*) in public or private building projects. The owner or public authority provides food in exchange for time and labour to the helper (*pengayah*). In the modern era, the process of architectural development in Bali has been handed over to private contractors (*pemborong*) with less involvement of people with each person involved receiving monetary compensation, compared to the traditional communal practice which was more common (Macrae & Parker, 2002).

Undagi in the process of building Balinese vernacular architecture in its network involves several actors with specific scopes of work. In simpler scopes of work, the number of actors is reduced and multi-tasking takes place. The larger the scope of work, the more actors are involved both in terms of specific types and quantity. These actors are *Sulinggih* (high

priest), *Pemangku* (lay priest), *Sangging/Juru* (artisan/craftsmen) and *Tukang* (builder) (Remawa, Santosa & Zaman, 2013; Arthana, Rachmawati & Prijotomo, 2018).

Many Balinese villages rely on vernacular architecture since its complex designs and constructions need specific labor. However, the deterioration of Balinese vernacular architecture threatens certain Balinese's economic resources. *Undagi* are organizers, master builders, masterminds, and design decision-makers. They lead building work (*ngawangun*) to avoid overlap, control quality, and manage time. According to Susanta (2017), the decadence of the *Undagi* is the loss of a key cultural actor in development that has caused the tradition of vernacular architecture in Bali to lose its spirit and leave only its 'outer skin' and banal expressions.

Research Methods

This research employs a multidisciplinary approach, incorporating a systematic evaluation of scholarly literature as a methodology. It qualitatively examines academic sources pertaining to the term "ngundaginini" within the context of the design and construction phases of Balinese vernacular architecture. This phrase refers to the working method employed by Balinese *Undagi* practitioners. Literature was selected by gathering scholarly works on the *ngundaginini* method spanning the years 1983 to 2023, resulting in a total of 16 relevant articles. Data presented in the literature are categorized according to the patterns of work.

This research methodology is presented in a schematic format as follows (Fig.1).

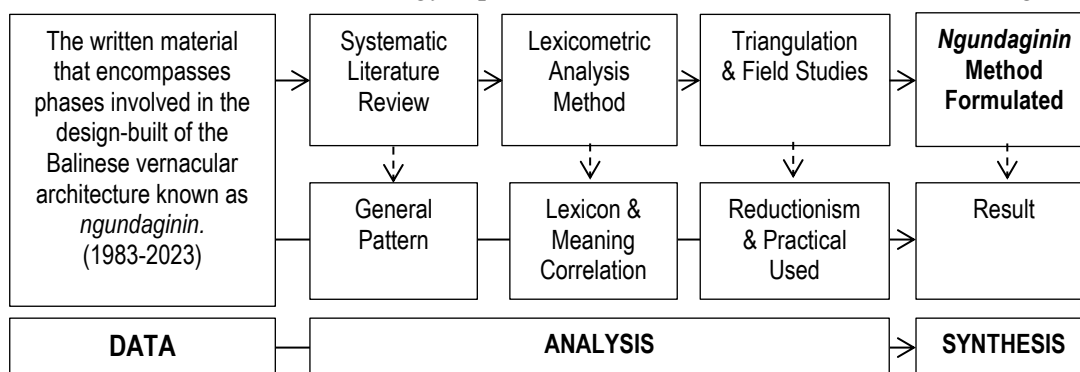


Fig. 2: Research Method

Source: Author

The variations in terminology and phrasing in the analysis is due to the dissemination of knowledge and the evolution of customary behaviors within the community over time, resulting in many discourses pertaining to the same topic. Consequently, a discourse analysis is conducted in order to ascertain the fundamental structure. Discourse analysis examines the patterns of knowledge that are generated, disseminated, and regulated through social behaviors in the utilization of language (Scholz, 2019). It employs the lexicometric approach by utilizing treecloud software to identify the most prevalent patterns and terms utilized (d'Huy, 2014).

Lexicometry encompasses a range of methodologies, including goals, descriptive, inductive, and scientific-technological approaches, which are rooted in the utilization of statistical analytic tools. In fact, lexicometric analysis facilitates the systematic reorganization of vocabulary within a given text corpus by scholars (Carvalho, Marques & Silva, 1999; Assunção & Araújo, 2019).

The process of triangulation is employed to re-validate the frequently occurring words identified in the lexicometric study. It involves the use of reductionist principles and the practical utilization of this method by modern *Undagi* practitioners. It also involves the comparison of lexicometric findings with traditional scriptural sources (*lontar*) Ashta Kosali dan Ashta Bhumi as *Undagi*'s basis guidelines, interviews with scholars, architects, designers, and contemporary *undagi* practitioners.

This approach comprehends the authentic vernacular architectural design process employed by contemporary *Undagi* and architects in the construction of vernacular architecture.

The legitimacy of the source was established by employing a rigorous process of critical analysis and triangulation, which involved conducting interviews with five stakeholders,

1. I Nyoman Gede Maha Putra, PhD-45yo (academic),
2. Dr. Anak Agung Gede Rai Remawa-59yo (academic),
3. I Wayan Balika Ika-60yo (Contemporary *Undagi* & interior-architectural practitioner)
4. I Gede Sedana-53yo and
5. I Made Sandi-63yo (traditional *Undagi*).

The research findings have led to the development of a design methodology for Balinese vernacular architecture known as *ngundagin*.

In following the process, the research analyzed using the lexicometric method to explore the number of words and lexicons that could later be categorized as related to architecture and *Undagi*. The lexicometric method enables the description of many discourses by analyzing specific and unique language usage, which may be understood in relation to historical and social contexts, as well as the persons and social groups involved in power dynamics. Computational methods serve as a rigorous approach to articulating these relationships, as they can be effectively converted into a language that can be understood by the machines. The notion of 'various applications' pertains to the comprehension of socio-linguistic variability (including historical contexts, social collectives, communicative circumstances, and genres) in connection with linguistic systems. Contrastive measurements allow for the differentiation of dominating topics, text types, genres, and subgenres (Scholz, 2019).

The lexicometric analysis was performed using the "treecloud" software, which may be accessed online at <http://treecloud.univ-mlv.fr> (Gambette & Véronis, 2010). The software known as 'treecloud' facilitates the organization of the most often appearing words in a given text into a tree structure that represents their 'semantic proximity.' This proximity refers to the co-occurrence of distinct semantic elements within the text. The dimensions and hues of each word correspond to their individual frequencies. The distance between two words in the tree is determined by their path length, which is calculated based on their linear word proximity. The software does a study of the lexical surface of the text, which means that the analysis of certain texts may be influenced by the characteristics of the language being used. Furthermore, this program does not consider differences in the lexical surface, such as synonymy, phraseology, or the use of common nouns against proper names of actors (d'Huy., 2014). The results of the analysis by the lexicometric method of the treecloud software show the following graph.

Findings

Ngundagin As *Undagi* Vernacular Design Method: A Systematics Literature Review

Previous scholars have documented and transcribed the sequential phases involved in the construction of *Undagi*. Nevertheless, due to the ubiquitous presence of *Undagi* in various regions of Bali, there are divergent perspectives regarding the design-build process. This research identifies a pattern that will subsequently be developed into a "standardized" *Undagi* architectural design method known as *ngundagin*, which encompasses pre-construction, construction, and post-construction stages.

Table 1: The *Ngundagin* Method from Various Author

Source: Author

No	Author	<i>Ngundagin</i> Method		
		Pre-Construction	Construction	Post-construction
		Design	Built	Post-Built
1.	(Gelebet, 1986; Arthana, Rachmawati & Prijotomo, 2018)	1. Ngewacak, 2. Nyapuh Karang 3. Nyukat gegulak, 4. Ngebah Kayu, Ngeruak Karang, 5 Mendem Dasar/Nasarin	6. Nglakar/ Akit-akitan, 7. Ngawub, 8, Ngakit, 9, Ngasren/Mayasin/ Mulasin	10. Ngulihin/ Memakuh karang 11. Ngurip/Pencaruan, Melaspas

2.	(Windhu, 1984)	1. Nyukat Gegulak, 2. Ngurip gegulak, 3. Nasarin	4. Ngawangun	5. Ngusap tain sepat, 6. melaspas
3.	(Putra, 2020)	1. Nyapuh karang, 2. Nyukat Gegulak, 3. Ngurip Gegulak	4. Nglakar/Akit-Akitan	5. Melaspas
4.	(Macrae & Parker, 2002)	1. Ngewacak, 2. Nyukat Gegulak (Ukur-Ukuran)	3. Ngawangun	4. Melaspas
5.	(Eiseman & Eiseman, 1989)	1. Ngewacak, 2. Ukur-ukuran, 3 Nasarin	4. Nglakar/Akit-Akitan	5. Melaspas
6.	(Putra & Gayatri, 2023)	1. Nyukat(ukur-ukuran), 2. Ngruak Karang, 3. Mulang pedagingan	4. Ngawub, 5. Ngakit, 6. Ngerabin	7. Melaspas
7.	(Subawa, 2019)	1. Nyapuh Karang, 2. Ngurip Gegulak, 3. Ngebah Kayu, 4. Ngruak Karang, 5. Mendem Dasar/Nasarin	6. Nglakar/Akit-Akitan, 7. Ngawub, 8. Ngakit, 9. Mayasin/Ngerabin	10. Ngulihin/memakuh karang, 11. Pengurip & Pencaruan, Melaspas
8.	(Wiryomartono, 2014)	1. Nyapuh Karang, 2. Nyukat karang, Making Gegulak. 3. Ngeruak karang, Mecaru 4. Narasarin	-	5. Pengurip-urip, 6. Pemelaspas
9.	(Supir, 2021)	1. Prayascita for Undagi before work, 2. Caru Pengruwak Karang Ritual,	3. Memakuh, Mepulang, Mapepada	4. Pemelaspas
10.	(Sukrawati, 2019)	1. Nyukat Karang, Making Gegulak, 2. Ngurip Gegulak, 3. Ngeruak, 4. Nasarin	-	5. Memakuh karang, 6. Melaspas/Mrelina Gegulak
11.	(Alit, 2003)	1. Mewinten Triguna, 2. Built Sanggar for Wiswakarma, 3. Nyukat Karang, Making Gegulak, 4. Ngurip Gegulak, 5. Ngeruak, 6. Nasarin	-	7. Memakuh karang, 8. Melaspas/Mrelina gegulak
12.	(Ferschin, Di Angelo & Paskaleva, 2013)	1. The Building (Bale) Determination 2. Nyukat karang, making gegulak, 3. Nguriping Gegulak	-	-
13.	(Howe, 1983)	1. The Area determination, 2. Nyukat karang, 3. Ngurip gegulak, 4. Ngeruak karang, 5. Nasarin	6. Akit-akitan, 7. Ngawub,	8. Memakuh karang, 9. Pengurip-urip, 10. Melaspas
14.	(Dwijendra, 2010, p. 42)	1. Nyakap karang, 2. Nyukat karang, making gegulak, 3. Ngeruak karang, 4. Nasarin,	5. Ngawub,	6. Prayascita, 7. Pengurip-urip, 8. Melaspas & Pencaruan
15.	(Swastika, 2014)	1. Pewintenan Saraswati, Pewintenan undagi, 2. Nyakap Pekarangan, 3. Mecaru Ekasato, 4. Nyukat Pekarangan and	7. Ngawub	8. Memakuh karang, 9. Pengurip-urip, 10. Melaspas

		<i>Gegulak making, 5. Ngebah kayu, ngurip kayu, 6. Nasarin</i>		
16.	(Luxiana & Parwata, 2022)	<i>1. Sukat/Gegulak, 2. Ngedum karang, 3. Nasarin</i>	<i>4. Bataran, 5. Ngawub, 6. Ngakit, 7. Mayasin/Mulasin</i>	<i>8. Melaspas, Ngebuin</i>
Legend: <input type="checkbox"/> = Balinese and Indonesian researcher; <input type="checkbox"/> = foreign researcher				

In the table 1, the 16 authors who discuss the *ngundagin* method show the stages of Bali vernacular architecture development by *Undagi*. Several recurring stages indicate that this stage is the main stage of the diverse stages of *ngundagin* and creates a discourse on the stages of *ngundagin* between the meaning of designing as a practice, the figure of the designer, and the object of design. The diversity is caused by the situation and the context of the place in Bali where the research was conducted. The different perspectives: between the religious perspective through the exploration of rituals, the architectural perspective through the exploration of design-build activities, and the difference in worldview as the basis of observation between local, Indonesian and foreign researchers plays a role in the interpretations. The difference is based on the concept and worldview of Balinese people who use flexibility to view cultural practices through the philosophy of differences in *desa* (space/place), *kala* (time), and *patra* (condition) (Wiryomartono 2014).

The lexicometry analysis result (Fig. 3) shows a clustering of words in word branches based on their semantics. The orange colored letters represent the high intensity of word occurrence and blue with intensity below orange, with letter magnitude indicating more frequent occurrence in the *ngundagin* method, and *vice versa*. Terms in orange color indicate words that are distributed in 4 branches. Branch one shows the words *urip-pengurip*; branch two shows *ngawub*; branch three shows *akit* and *ngelakar* and the branch 4 shows the words *ngewacak*, *gegulak*, *nyukat*, *ngeruak*, *ngurip*, *memakuh*, *nasarin karang*, *melaspas*, and *gegulak*.



Fig. 3: Lexicometric analysis on various *Ngundagin* stages
Source: Author

The frequently appearing words are not automatically formulated into stages of *ngundagin* due to the research. The collection of *ngundagin* stages from various authors are reviewed, compared with the results of the lexicometric analysis, and re-contextualized with the

design stages carried out by contemporary *Undagi* and designer-architects who still practice in a hybrid manner, combining traditional stages and rituals with modern design methods.







Modern design methods are then sought for their traditional equivalents by adjusting the stages in the field that are yet to be included in the author's previous version of the *ngundaginin* methods. An example is *nureksin*, or what is equivalent to survey activities. Previous authors have noted that there are terms with different names. This addition becomes essential when the *ngundaginin* stage is confronted with the practice of contemporary *Undagi*, the first survey carrying out the next stage (interview A.A. Gede Rai Remawa, 2023).











Some stages after being confirmed to contemporary *Undagi*, academics, and cultural experts say that not all were done by *Undagi*; sometimes *Undagi* delegated them to other colleagues (*Pemangku*, *Sanging* and *Juru*) (interviews A.A. Gede Rai Remawa, I Nyoman Gede Maha Putra, and I Wayan Balika Ika, 2023). The outcomes of the triangulation procedure, employed as a means of formulating *ngundaginin*, is presented in a tabular format. The table consists of columns for an icon, stage, description, and phase.







The utilization of minimalist symbols in the form of icons serves to depict the various stages involved in the process of formulation, with the objective of elucidating these steps in a manner that is universally comprehensible and accessible to readers from diverse cultural backgrounds. The research employs the color orange as the foundational hue in the icon to symbolize the primary phases executed by *Undagi*, while the color blue is utilized to represent stages that are not directly executed by *Undagi* but are nevertheless coordinated with *Undagi*. The stages in the blue base color also represent how the stages are delegated by the *Undagi* to the other building actors.











Table 2: Final *Ngundaginin* Method

Source: Author

Icon	Stage	Description	Phase
1. Ngewacak (<i>Undagi-Client (adrebe umah) Consultation</i>)			
		1.1. Undagi-Client (<i>adrebe umah</i>) Consultation witnessed by Siwa through <i>pejati</i> offerings carried out by selecting a good day (<i>Dewasa Ayu</i>) (Macrae & Parker, 2002); <i>undagi</i> asking about social status, building quality based on status (<i>Utama</i> , <i>Madya</i> , <i>Kanista</i>), material selection), how many <i>sasaka</i> (poles) determine the size of the building (<i>bale</i>)(Eiseman & Eiseman, 1989), asking the client's birthday (<i>otonan</i>)(Bidja, 2001).	PREPARATION
		1.2. Undagi Personal Preparation at the Pre-Build stage is carried out by ritual self-purification with <i>undagi</i> (<i>Maprayascita</i>), Making <i>sanggar tawang</i> (small shrine) with <i>pejati</i> offerings as an offering to Bhagawan Wiswakarma at the location to be built (Windhu, 1984).	
2. Nureksin (Site Survey)			
		The site survey was conducted by <i>undagi</i> analyzing the site, building placement on the site determination, orientation, analyzing the position of the house (<i>ala ayuning karang</i>), how much to spend on materials according to the span of the house (Putra, 2020).	

3. The <i>Ngeruak Karang</i> (land clearing) ritual is carried out by the <i>Pemangku</i>		PRE-CONSTRUCTION	
			Land clearing rituals are usually led by pemangku, or can also be led directly by <i>undagi</i> (<i>pemangku undagi</i>) (Arthana, Rachmawati & Prijotomo, 2018). It aims to neutralize bad things that may have previously existed on the land, so that when it will be occupied it can provide coolness and harmony for its residents and avoid unwanted disturbances (Girinata, 2020).
4. <i>Nyukat Karang</i> (land measurement) with <i>Lontar Ashta Bhumi</i> Guidelines			
			<p><i>Undagi</i> taking the occupant's body measurements, taking the Measurement of built area (<i>sukat genah/natar</i>) with <i>depa-asta-musti</i> dimensions (Eiseman & Eiseman, 1989; Putra, 2020) The types of <i>sukat</i> (measurements) used include:</p> <ul style="list-style-type: none"> • <i>Sukat Bale/Wewangunan</i>: <i>Sukat Gajah</i> (for Brahmana, Bhujangga, Wiku, Pandita), <i>Sukat Dwaja</i> (for Shrine conducted to Dewa, Parhyangan (temples), Sanggar (small shrine)), <i>Sukat Singa</i> (for house of ksatria, wesya), and <i>Sukat Wreksa</i> (for house of <i>prabali</i> (Bali origin), <i>Pande</i> (metal smiths), <i>Petani</i> (farmers), <i>Gembala</i> (shepherds)) • <i>Sukat Pangalah</i> (<i>bale banyu</i>, <i>sanggar waringin</i>, <i>gedong simpen</i>, <i>Gajah Pelesungan</i>, <i>Macan Pancuran</i>, <i>Wara keweruh</i>, <i>Gedong punggul</i>). • <i>Sukat tapak</i> (Sri, Indra, Guru, Yama, Rudra, Brahma, Kala, Uma +<i>pengurip</i>)(Nikanaya <i>et al.</i>, 2007).The placement of the door (<i>pamesuan</i>) is also determined through the orientation direction of the house (Howe, 1983).
			
5. The Groundbreaking (<i>Nasarin</i>) ritual is led by the <i>Pemangku</i> (lay priest)			
		5.1 The groundbreaking ritual on the excavated foundation.	
		5.2 The foundations were installed and the raising of the floor (<i>bataran</i>) began.	
		5.3 The installation of the post base (joint or <i>jongkok asu</i>) is in accordance with the number of poles (Wijaya, 2016). <i>Jongkok asu</i> (post base) as a pile foundation is made according to the number of piles to be installed, and becomes the basic structure that connects the construction of the building floor and the foundation under the ground (Subawa, 2019).	
6. <i>Nyukat</i> (Measuring) for <i>Saka</i> (Pole) and <i>Lambang</i> (Roof Construction) and <i>Gegulak Saka</i> Making With <i>Lontar Ashta Kosali</i> as Guidelines			
		6.1. <i>Nyukat sesaka</i> uses the occupant's body measurements for the length, width and anatomical structure of the <i>saka</i> (pole) (Kagami, 1988). The size of the <i>Gegulak Saka</i> reaches 2.5 M in length while the crest reaches 6.20 M (interview with A.A. Gede Rai Remawa, 2023).	

		<p>6.2. All body measurements are marked on a piece of bamboo used as a measurement module for building elements called <i>gegulak</i>. <i>Gegulak</i> is made of bamboo slats (\pm the width of the middle finger / one and a half fingers), which are given notches for the length of the building owner's limbs or anthropometry. <i>Gegulak</i> as a benchmark for determining <i>sukat</i> (size and dimensions) in the traditional construction process in Bali, can be viewed as an object and as a basic measurement module (Arthana, Rachmawati & Prijotomo, 2018)</p>	
		<p>6.3. The <i>nyanggra</i> and <i>ngurip gegulak</i> activities are the beginning of the whole series of construction (Arthana, Rachmawati & Prijotomo, 2018). This ritual becomes a kind of 'inner contract' between the <i>undagi</i> and his client witnessed by God (upper world) and also <i>Bhuta Kala</i> (lower world). This agreement is binding and becomes a commitment between both parties to complete the house properly (Putra, 2020). This ceremony is performed by the <i>Undagi</i> himself and accompanied by the people who will build the house (Subawa, 2019).</p>	
<p>7. Ngebah Kayu (Cutting Down Trees) and Akit-akitan (Creating building structures and constructions) (Undagi delegates to Sangging and Juru)</p>			
		<p>7.1. <i>Undagi</i> choose the right wood according to the type of building and the socio-economic status of the inhabitants. The use of wood is differentiated between the buildings of <i>Parahyangan</i> (shrine), <i>Bale</i> (living pavilion), <i>jineng</i> (rice granary) and <i>paon</i> (kitchen) where the type of wood in the building is classified again from <i>Prabhu</i>, <i>patih</i>, <i>Arya</i>, <i>Tumenggung</i>, <i>Demung</i> (analogy of hierarchical royal positions)(Nikanaya <i>et al.</i>, 2007).</p>	
		<p>7.2. The felled wood is then processed by submerging it in a fast-flowing river to preserve it for a short period of time. When the wood is dried and then the process of splitting the wood begins with a ritual. The wood is then processed into a building frame structure with a connection system with a <i>sunduk</i> (mortise-tenon), where at the time of disposal a ritual is also carried out (interview with I Wayan Balika Ika, 2023).</p>	

		<p>7.3. The <i>sangging</i> starts preparing the structural elements of the wooden building, usually at the <i>undagi's</i> workplace, separate from the site. The assembly (<i>akit-akitan</i>) and <i>pepasangan</i> (construction) of traditional Balinese buildings are generally very simple. This is understandable because Balinese buildings support simple functions. With a detailed division of functions, Balinese buildings do not need to be too large. Materials are arranged in such a way that they also serve a decorative function. By showing its natural character in an organized way, each material can provide its own artistic value (Windhu, 1984).</p>	
<p>8. Ngawub and Ngakit/Memakuh (Construction Assembly on Site) Worked by <i>Undagi</i> and <i>Tukang</i></p>			
		<p>8.1 <i>Undagi</i> began to install the main structure of the building and its supporting frame. The assembly ceremony called <i>Ngawub sunduk</i> begins by inserting the <i>sunduk</i> pen into the hole of the pole (<i>saka</i>) followed by the next assembly process after all construction elements are completed (Subawa, 2019). In the assembly process <i>undagi</i> sprinkles water (<i>tirta undagi</i>) between the <i>saka</i> (pole) and <i>sunduk</i> (connection) in the <i>kaja-kangin</i> (northeast) direction first, then continues with the assembly (Putra & Gayatri, 2023)</p>	CONSTRUCTION
		<p>8.2 Installation of building elements and construction details including the building walls (<i>bale</i>) and roof (<i>raab</i>). Once all construction elements are complete, the <i>ngerabin</i> ceremony continues and workers install the roof (<i>ngerabin</i>) (Subawa, 2019). With the clarity of the construction exposed, the construction elements also function as ornaments in terms of the interior that can explain between the main function it supports and its addition as an ornament (Windhu, 1984).</p>	
		<p>8.3 The process of finishing and installing stairs, carvings and all kinds of efforts made until the building is completed. The structural elements of the building that are visible from the interior will be coated with a clear finish to retain the character of the wood and make it more presentable. For customers who can afford it, the <i>bale</i> will be stained (<i>pulas</i>) with a layer of red and gold (<i>prada</i>/gold leaf) (Wijaya, 2016).</p>	
<p>9. Melaspas (Building Inauguration) Ritual Performed by <i>Pemangku</i> or <i>Pemangku Undagi</i></p>			
		<p>The inauguration ritual means welcoming the birth of a new building, part of the family, to provide positive vibrations for the occupants (Howe, 1983). The purpose of the <i>melaspas</i> ceremony is to purify the building after being formed in the previous ceremony (Sukrawati, 2019). During the <i>melaspas</i> ritual, the building materials (wood and stone) are transformed into one building unit, and named according to the type of <i>bale</i> built (<i>Betara Stri Asih, Kusumadewi, Prabhu</i></p>	POST-CONSTRUCTION



		Anara Nagara, Prabhu Ngerebut Kadaton etc.) (Interview A.A. Gede. Rai Remawa, 2023).	
Legend:			
	= Direct Practice by an <i>Undagi</i> ; a general domain for <i>Undagi</i>		
	= <i>Undagi</i> delegates to college (<i>pemangku, sangging/juru, tukang</i>)		

Table 2 presents an overview of the sequential stages involved in the *ngundagin* process, which encompasses a total of nine distinct phases dedicated to the construction of vernacular architecture in the region of Bali. *Undagi* is a notable individual involved in the various stages of architectural design and construction in Bali (Eiseman & Eiseman, 1989; Peters, 2013). These stages encompass consultation, site assessment, measurement, land clearing rituals, material selection, frame construction (*ngerangkan/nglakar/akit-akitan*), installation of *sunduk* on *saka*-poles called *ngawub*, frame assembly (*ngakit/memakuh*), and finalizing the building until the inauguration ceremony (*melaspas*) (Howe, 1983; Arthana, 2020). During the construction process, *Undagi* engages in design activities during the pre-construction stage. This involves conducting interviews, surveys, and measurements to collect relevant data (Putra & Gayatri, 2023). Subsequently, *Undagi* analyzes this data to establish a design concept. The execution of the measurement and design process is then delegated to the *Sangging*, who constructs the building frame (Dwijendra & Adhika, 2022). Prior to installation at the construction site, *Undagi* performs a comprehensive evaluation of the entire building frame to ensure its suitability (Remawa, Santosa & Zaman, 2013).

Undagi, a practitioner in the field of Balinese vernacular architecture, employs a design methodology that eschews traditional sketching techniques. Instead, the design process is implemented primarily mentally, without the use of visual representations. In addition to possessing the ability to mentally envision the completed structure, which is not facilitated by the use of building plans or drawings in traditional Balinese society, an *Undagi* must possess comprehensive knowledge in the areas of spatial orientation, religious philosophy, and local customs (*awig-awig*). Furthermore, they must be proficient in conducting a variety of minor rituals, including the groundbreaking ceremony (*ngeruak*) and the consecration of the completed building (*pemelaspas*) (Peters, 2013). The “non-drawing” technique diverges from contemporary architectural designers who place emphasis on the design process through the utilization of representational mediums, such as hand sketching or computer-aided design (CAD). The cognitive processes of designers can be externalized and communicated through various means, such as sketching and other types of visual representation (Orthel & Day, 2016). In a conducted empirical study including practitioners of traditional *Undagi*, Gede Sedana and Made Sandi from Denpasar were interviewed regarding the ideation process underlying the creative stages of design in their professional *Undagi* practice. Both participants expressed their perspectives on this matter.

“*ten ngidang tiang nyelasin, anak sami sampun wenten ring weteng tiang, jeg pesu je nika, tiang elah nyalanang, minab taksu undagi tiang ne nuntun tiang*”
(I am unable to provide an explanation for it. All necessary information is already present within my cognitive faculties. When I am inclined to engage in work, the ideation process spontaneously emerges, enabling me to proceed without the necessity of deliberate analysis. Perhaps it is the presence of *taksu undagi* within me that serves as my guiding force..)

Interview: Gede Sedana & Made Sandi, 2022

Similarly, Wayan Balika Ika, a contemporary *Undagi* and entrepreneur specializing in traditional Balinese architecture, was queried regarding the conceptualization process involved in the various phases of *Undagi* design. In response, Balika provided the following statement:

“In the present era, the limited supply of land poses a constraint on the adherence of Balinese buildings to the prescribed Ashta Kosali standards. The brainstorming process in design, however, is conducted using modules derived from prior experiences. Balinese architecture exhibits a modular and highly adaptable nature, wherein the dimensions of the land and its alignment enable me to intuitively compute and envision the design. If the customer consents, I shall proceed with the delivery to the carver, also known as "sangging." In instances where the architectural structure is intricate, encompassing a fusion of contemporary and Balinese architectural styles, I occasionally find it necessary to utilize design drawings in order to achieve a heightened level of precision in the placing process.”

Interview: I Wayan Balika Ika, 2023

Both vernacular and contemporary *Undagi* assert that the process of ideation occurs inside the realm of the mind and is characterized by the spontaneous emergence of aesthetic and creative intuition. The attainment of this process necessitates a substantial amount of work experience, as evidenced by an interview conducted with I Nyoman Gede Maha Putra (2023), a scholar specializing in architecture and urban planning at Warmadewa University Research Center-Denpasar.

According to Maha Putra, the design stage of *Undagi* vernacular architecture encompasses a series of stages that are acquired through direct apprenticeship with experienced *Undagi* practitioners. The enhancement of the ideation process in *ngundagin* is derived from the outcomes of conventional educational endeavors and practical work experiences, culminating in the individual's inauguration as an *Undagi*. Maha Putra elucidates the sequential phases of conceptualization within the *ngundagin* method, which serves as the fundamental framework for *Undagi* practice in the design and construction of Balinese vernacular architecture.

On the other hand, contemporary architects undergo formal education that include design studios, internships, and research, wherein the cognitive, affective, and psychomotor dimensions are tailored to the specific requirements of the architectural field. In contrast, the *Undagi* do not partake in formal education, instead opting to engage directly in fieldwork to empirically observe, act, and cultivate their sensitivity and intuition. According to Maha Putra, the ideation process of *Undagi*'s vernacular architectural design emerged as a result of the extensive work undertaken by *Undagi*, which allowed them to directly engage with the intricate issues posed by projects in the field.

According to Maha Putra, the emergence of *Taksu Undagi* is rooted in intuition, since the conceptualization of the design process is influenced by a synthesis of memory (*smrti*), empirical experience (*darsana*), and a continuous pursuit of knowledge (*swadyaya*). The degree to which these three factors are effectively grasped will directly influence the level of excellence achieved in *Taksu Undagi*. The practical use of *Taksu Undagi* is facilitated through the utilization of the *ngundagin* method, which is further reinforced by the implementation of *palatanda*, including both technical and practical solutions.

Moreover, the field presents many project obstacles that need to be addressed (*ngawangun*). The amalgamation of these two entities results in the capacity of *ngarencana*, which can be considered analogous to the concept of design thinking and its application. The utilization of the design thinking process in addressing difficulties within the area is closely linked to the level of proficiency an *Undagi* possesses in *Taksu Undagi*. The fundamental structure of the *ngundagin* method is ultimately shaped by the intricate integration of these several components, as depicted in the diagram provided (Fig. 4).

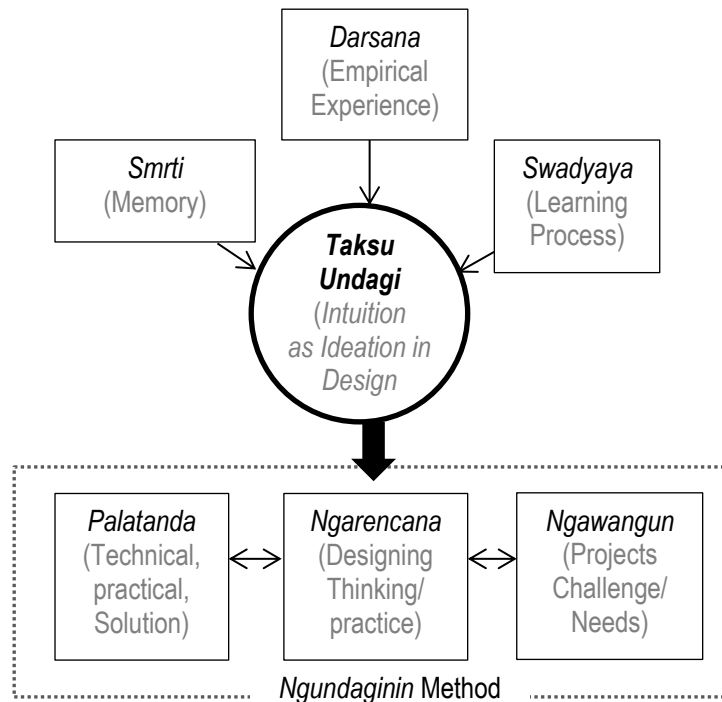


Fig. 4: Ideation process in *Ngundaginin* method

Source: Interview I Nyoman Gede Maha Putra (2023); schemed by Author

Undagi diligently incorporates classic architectural manuscripts such as lontar Ashta Kosali and Ashta Bhumi text as a form of explicit knowledge. However, during the process of *ngundaginin*, *Undagi* assigns greater significance to tacit knowledge, which is derived from their work practices and accumulated experiences. According to a study shown that there is a low level of application (0.5%) of Ashta Kosali texts in Bali architecture structures located in Gianyar regency. This indicates a negative influence as highlighted in the research (Rai Remawa, 2017). The research is supported by Howe, who asserts that, as a general observation, modern *Undagi* must acquire knowledge of the contents of traditional Balinese architectural lontar manuscripts by reading. The texts are typically referred to solely in instances where there is a discrepancy regarding a rule or method, or when it becomes imperative to acknowledge a rule that is infrequently utilized (Howe, 1983).

The utilization of tacit knowledge as the primary form of knowledge application distinguishes the operational methodologies of *Undagi* practitioners employing the *ngundaginin* method from contemporary architects who integrate both explicit and tacit knowledge, encompassing cognitive, affective, and psychomotor dimensions within their educational framework. This disparity in knowledge utilization ultimately influences the outcomes they generate. In order to ensure the continuity of the *Undagi* tradition within Balinese residential culture, it is imperative for Balinese *Undagi* practitioners to enhance their proficiency in traditional literature. This will enable them to effectively transmit the authentic *Undagi* tradition to future generations, hence ensuring its survival.

The findings show that the *ngundaginin* method has strengths and weaknesses in its application to modern architectural design methods. Its strength lies in:

- The *Undagi*'s understanding of the materials, ideas, and execution of the building in a holistic manner between the spirit within and the physicality that houses it.
- Adherence to the laws of nature, collaboration with others, and the practice of religiosity in a universal purpose are the ultimate goals of design.
- It emphasizes the integration process of architectural design on harmonizing man with nature, man with amongst man, and man with divine consciousness (in Bali, known as the philosophy of *Tri Hita Karana*-the three causes of happiness).

On the weaknesses,

- The *ngundagin* method focuses on designing traditional Balinese wood-based residential buildings where ritual processions are required.
- The *ngundagin* method focuses on working on a single house, which would be irrelevant in a housing development.
- The ritual involved in each process makes it seem local-sectarian, not reaching global-universal clients.

The strengths and weaknesses of the *ngundagin* method can be balanced through modern architectural design practices that apply the ideology of sustainability and prioritize the spirit of balancing Nature, people, and divine consciousness for a better quality of life. Thus in the development practice with materials and technology that develops, it still prioritizes traditional positive values that are still relevant. The value of spiritually and physically improving the quality of human life, unification and harmonization with Nature, and improving the quality of life of planet earth is the core of the *ngundagin* method that must be preserved into the future.

Conclusion

According to research findings, the *ngundagin* method, as demonstrated by Balinese *Undagi*, has been identified as a significant phase in the development of vernacular architecture in Bali. The *ngundagin* method, employed in the creation of vernacular architecture in Bali, encompasses three primary stages:

Pre-Construction,
Construction, and
Post-Construction.

The Pre-Construction stage encompasses several key activities.

Firstly, there is the *Ngewacak*, which involves consultation between the *Undagi*-Client (the party responsible for constructing the house) and the client. Secondly, the *Nureksin* takes place, which entails doing a thorough site survey. Thirdly, the *Pemangku*, a lay priest, performs the ritual known as *Ngeruak Karang*, which involves clearing the ground.

The utilization of *Nyukat Karang*, a land measurement unit, in accordance with the Lontar Ashta Bhumi Guidelines. The ritual known as the Groundbreaking (*Nasarin*) is conducted under the guidance of the *Pemangku*, who serves as the lay priest. During this ritual, specific measurements, referred to as *Nyukat*, are used for the construction of the *Saka* (Pole) and *Lambang* (Roof construction).

Moreover, the process of creating the *Gegulak Saka* (pole measurement module) is carried out following the guidelines provided by the Lontar Ashta Kosali. The activities of *Ngebah Kayu* (Cutting Down Trees) and *Akit-akitan* (Creating building structures and constructions) are delegated by *Undagi* to *Sangging* and *Juru*. The construction assembly on site, known as *Ngawub* and *Ngakit/Memakuh*, is carried out by skilled workers known as *Undagi* and *Tukang*. The *Melaspas* ritual, also known as the Building Inauguration ritual, is often conducted by the *Pemangku* or *Pemangku Undagi* during the post-construction phase.

The findings indicate that the *Ngundagin* method, which is a traditional Balinese approach to designing and constructing buildings, exhibits a correlation with contemporary architectural design processes. The association between design activities performed by an *undagi* during the pre-construction stage is evident in the building phase. During the pre-construction phase, *Undagi* engages in interviews, surveys, and measurements to collect data. Subsequently, *Undagi* analyzes this data to establish a design concept. The measurement and design processes are then delegated to *Sangging* for the construction of the building frame. Prior to installation at the construction site, *Undagi* conducts a comprehensive evaluation of the entire building frame.

The Process suggests that the *Undagi* have a distinct perspective on architecture as a designer, characterized by divergent philosophies, practices, and outcomes. The fundamental principle underlying the *ngundagin* method employed by Balinese *Undagi* practitioners is the incorporation of *tattwa* (knowledge), *susila* (ethics), and *upacara* (ritual) as the foundational

frameworks of Hinduism. This approach is aimed at constructing architectural edifices that serve as a conduit for attaining Tri Hita Karana, encompassing *Parahyangan* (the harmonization of individuals with the divine), *Pawongan* (the harmonization among human beings), and *Palemahan* (the harmonization of humans with the natural environment).

The *ngundagin* technique elucidates the correlation between the *Undagi*'s worldview and their perception of architecture as an outcome of deliberate design. Thus, Balinese vernacular architecture embodies a representation of a celestial entity that is intended to harmoniously coexist with the individuals residing within it. The coexistence of subject and object in architecture demonstrates a symbiotic relationship, wherein both elements mutually reinforce, impact, and cooperate to enhance the overall quality of human living. The *Ngundagin* method demonstrates that the architectural design process does not solely generate lifeless objects driven by economic considerations, but rather establishes a platform and mechanism through which individuals can actualize an improved quality of life.

The strengths and weaknesses of the *ngundagin* method when applied into modern design process, can be balanced through architectural design practices that apply the ideology of sustainability and prioritise the spirit of balancing nature, humans and divine consciousness for a better quality of life. So that in the practice of development with materials and technology that develops, it still prioritises traditional positive values that are still relevant. The value of improving the quality of human life both spiritually and physically, unification and harmonisation with nature and improving the quality of life of planet earth, is the core of the *ngundagin* method that must be preserved into the future.

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