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Local wisdom-based sustainability communication among balinese farmers: traditions, rituals, and sustainable agricultural practices

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Abstrak

Pertanian berkelanjutan di Bali lahir dari integrasi harmonis antara nilai-nilai budaya, spiritualitas, dan kearifan lokal yang diwariskan secara turun-temurun. Namun, meningkatnya tekanan perubahan iklim dan tuntutan peningkatan produktivitas pertanian memunculkan pertanyaan krusial: bagaimana nilai-nilai tradisional ini dapat diintegrasikan dengan prinsip-prinsip pertanian berkelanjutan yang secara global menekankan efisiensi sumber daya, konservasi lingkungan, dan ketahanan pangan? Hal ini menjadi semakin relevan karena elemen utama pertanian berkelanjutan seperti konservasi tanah dan air, penggunaan input secara bijak, diversifikasi tanaman, serta pelestarian ekosistem harus dipahami dalam konteks sistem pertanian Bali yang sarat nilai budaya. Penelitian ini bertujuan untuk menggambarkan praktik pertanian berkelanjutan di Subak Karangasem, Desa Noongan, Kabupaten Karangasem, dengan menyoroti peran nilai-nilai tradisional serta ritual Tumpek Uduh dalam menjaga keseimbangan ekologis, sosial, dan spiritual. Penelitian menggunakan pendekatan kualitatif deskriptif dengan desain studi kasus. Data dikumpulkan melalui wawancara mendalam, observasi lapangan, dan dokumentasi visual terhadap tiga informan utama. Hasil penelitian menunjukkan bahwa meskipun terjadi pergeseran komoditas dari padi ke tanaman hortikultura seperti cabai dan tomat, para petani di Subak Karangasem tetap mempertahankan prinsip Tri Hita Karana sebagai dasar filosofi praktik pertanian mereka. Ritual Tumpek Uduh berfungsi sebagai penguat simbolik rasa syukur dan penghormatan terhadap alam, mencerminkan keyakinan bahwa tumbuhan dan lingkungan merupakan bagian integral dari sistem ekologi yang harus dijaga. Selain itu, sistem subak tidak hanya berfungsi sebagai lembaga pengelola air, tetapi juga sebagai struktur sosial budaya yang memperkuat gotong royong dan partisipasi komunitas. Penelitian ini menyimpulkan bahwa keberlanjutan pertanian di Bali tidak hanya ditopang oleh adaptasi teknologi, tetapi terutama oleh kearifan lokal yang menjaga harmoni antara manusia, alam, dan Tuhan.

Kata kunci: Pertanian Berkelanjutan, Kearifan Lokal, Subak Karangasem Desa Noongan, Tumpek Uduh, Komunikasi Keberlanjutan.

Abstract

Sustainable agriculture in Bali emerges from a harmonious integration of cultural values, spirituality, and local wisdom inherited across generations. Yet, increasing pressures from climate change and the demand for higher agricultural productivity raise a crucial question: how can these traditional values be integrated with global sustainability principles that emphasize resource efficiency, environmental stewardship, and food security? This becomes particularly relevant as key elements of sustainable agriculture such as soil and water conservation, responsible input use, crop diversification, and ecosystem preservation must be interpreted within Bali's culturally embedded agricultural system. This study aims to describe sustainable agricultural practices in Subak Karangasem, Noongan Village, Karangasem Regency, by examining the role of traditional values and the Tumpek Uduh ritual in maintaining ecological, social, and spiritual balance. Using a descriptive qualitative approach with a case study design, data were collected through in depth interviews, field observations, and visual documentation involving three key informants. The findings show that despite a commodity shift from rice to horticultural crops such as

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chili and tomatoes, farmers in Subak Karangasem continue to uphold the principles of Tri Hita Karana as the philosophical foundation of their agricultural activities. The Tumpek Uduh ritual serves as a symbolic reinforcement of gratitude and respect for nature, reflecting the belief that plants and the environment are integral components of the ecological system that must be protected. Furthermore, the subak system functions not only as a water management institution but also as a sociocultural structure that strengthens community participation and mutual cooperation. This study concludes that sustainable agriculture in Bali is supported not only by technological adaptation but, more importantly, by local wisdom that maintains harmony between humans, nature, and God.
Keywords: Sustainable Agriculture, Local Wisdom, Subak Karangasem Noongan Village, Tumpek Uduh, Sustainability Communication.

Introduction

The era of globalization and the rapid development of digital technology have brought profound changes to lifestyles and economic systems worldwide, including the agricultural sector. Over recent decades, modern agriculture has increasingly focused on achieving high productivity through mechanization, the use of chemical fertilizers, and more efficient distribution systems. However, this approach has often overlooked environmental sustainability and the socio-cultural values deeply embedded in agrarian societies (Belz & Peattie, 2012). Consequently, a new paradigm of sustainable agriculture has emerged, emphasizing not only economic efficiency but also ecosystem conservation and the social well-being of farming communities (FAO, 2023).

Moreover, international studies indicate that sustainability challenges in agriculture depend not only on improving productivity and resource efficiency but also on the ability of agribusiness actors to understand and respond to the growing complexity of their task environments. The FAO report The State of Food and Agriculture (SOFA) 2021 highlights that vulnerability in this sector can directly affect global food security. Approximately three billion people are currently unable to access healthy diets, and this number could increase by up to one billion if economic shocks reduce household incomes by one-third (FAO, 2021). These conditions are further reinforced by the findings of Calicioglu et al. (2019), which show that women in rural areas face greater barriers to economic access than men, thereby increasing the risk of social vulnerability.

These findings demonstrate that sustainability must not only be implemented through environmentally friendly agronomic practices but also integrated into managerial strategies, organizational structures, and supply chain dynamics. Rising demands for accountability and new social norms (Lubin & Esty, 2010) have encouraged agribusiness firms to expand their roles beyond commodity production, engaging instead in addressing global challenges that were previously more closely associated with the public sector (Maak et al., 2016). In line with the 2030 Sustainable Development Goals (SDGs), numerous studies identify business organizations in the agricultural sector as key actors in driving sustainability transformation, particularly because governments often require longer timeframes to address environmental and social issues (George et al., 2015).

In the context of sustainability communication and management, research shows that sustainability practices are strongly influenced by community communication patterns and mechanisms of intergenerational value transmission. Astuti et al. (2023) emphasize that community communication strategies can strengthen social solidarity and expand the reach of environmental education through digital media. Meanwhile, Mahadewi and Pratama (2022) highlight the importance of social media as a tool for preserving local culture, particularly in reinforcing narratives of traditional agricultural identity. Other studies also demonstrate that the transmission of agrarian values and traditions requires effective intergenerational communication (Suryani & Putra, 2023), including within local organizational structures such as Subak (Dewi & Hartawan, 2021). In addition, the use of social media has been shown to support farming communities in environmental advocacy and the dissemination of information related to

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sustainable agricultural practices (Wijaya & Paramita, 2022).

Therefore, sustainability should not be implemented solely at the operational level but must also be developed through a multilevel theoretical framework that links institutional change (Schneider et al., 2017), organizational practices and value chains, and corporate contributions to sustainable development as its ultimate outcomes. This approach enables a more comprehensive understanding of how companies utilize and reconfigure natural resources to generate broader socio-economic impacts (Parente et al., 2021).

In Indonesia, the concept of sustainable agriculture is highly relevant to local wisdom. One prominent example is the Subak system in Bali, which was recognized by UNESCO as a World Cultural Heritage in 2012 (UNESCO, 2012). Subak is a socio-religious organization that regulates water management for rice fields through a communal network of canals, tunnels, small dams, and terraced landscapes.

The uniqueness of Subak lies in the philosophy of Tri Hita Karana, which emphasizes harmony between humans and God, humans and other humans, and humans and nature (Windia & Dewi, 2007). Subak is not merely a technical irrigation system but an integrated social, religious, and ecological structure.

One important manifestation of Tri Hita Karana values is the Tumpek Uduh ritual, conducted every 210 days as a form of reverence to Sang Hyang Sangkara, the deity who protects plants and vegetation (Sutawan, 2000). This ritual embodies ecological, social, and spiritual dimensions that remind farmers of their responsibility to preserve the natural environment (Windia, 2006; Geertz, 1973).

The strength of the Subak tradition is also sustained through intergenerational communication patterns, in which agricultural and spiritual values are transmitted through hands-on practice, oral storytelling, and shared rituals. These findings align with the concept of sustainability communication described by Prajnawrdhi (2023) and Putri and Nugraha (2023), and are further supported by the study of Suryani and Putra (2023) on intergenerational communication in the transmission of Balinese cultural traditions.

Method

This study employed a qualitative descriptive approach with a case study design to explore in depth the practices of sustainable agriculture rooted in local cultural values within the Subak Karangasem system, located in Noongan Village, Karangasem Regency, Bali. A qualitative approach was considered appropriate because the objective of the study was not to test causal relationships, but to understand meanings, values, and lived experiences associated with traditional agricultural sustainability at the community level.

The case study design enabled a contextual and holistic examination of traditional farming practices, including cropping patterns, land and water management, and ritual activities such as *Tumpek Uduh* that are integrally embedded in the Subak system. This design is widely used in sustainability and cultural studies to capture complex social, ecological, and spiritual interactions within a specific setting.

Research Site and Informants

The research site was Subak Karangasem in Noongan Village, Karangasem Regency. Informants were selected using purposive sampling, based on their direct involvement and experience in Subak activities. The informants included the pekaseh (head of Subak), senior farmers, and active members who regularly participated in farming activities and ritual practices. This selection ensured that the data reflected authentic perspectives on traditional agricultural sustainability.

Data Collection Procedure

Data were collected through in-depth interviews, field observations, and documentation over two planting cycles. Semi-structured interviews were conducted to allow informants to freely express their experiences, beliefs, and interpretations related to farming practices and rituals. Field observations focused on daily agricultural activities, collective work practices, and ritual implementation, while documentation included photographs and field notes to support data triangulation.

Data Analysis Technique

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Data analysis followed the interactive model proposed by Saldana et al. (2014), consisting of three stages: data condensation, data display, and conclusion drawing and verification. To ensure trustworthiness, data validity was maintained through source and method triangulation, as well as member checking, whereby key findings were reconfirmed with informants. This analytical process allowed for a comprehensive understanding of how local values support agricultural sustainability within the Subak system.

Result and Discussion

The results of the study indicate that agricultural practices in Subak Karangasem, Noongan Village, Karangasem Regency, continue to adhere strongly to traditional values, even though the cultivated commodities have shifted from rice to horticultural crops such as chili and tomatoes. This shift has occurred due to increasing market demand and the limitation of paddy field areas; however, farmers continue to preserve the social and spiritual systems inherited from their ancestors.

The agricultural process begins with the seedling stage, during which farmers such as I.M.A. and K.A.N. select chili and tomato seeds from the best yields of previous harvests. The seeds are soaked in coconut water to enhance germination, then sown in small seedbeds protected from rain. Initial fertilization is carried out using homemade organic fertilizer derived from livestock manure and straw, as farmers believe that the soil must be "revitalized" naturally to remain fertile and to retain its organic elements.

The next stage is planting, which is conducted through mutual cooperation (gotong royong). Prior to planting, farmers perform the ngendag tanah ritual as a form of land purification. They offer canang sari and bubuh putih while reciting prayers to ask permission from nature so that the crops may grow well. This ritual represents a tangible expression of harmony between humans and nature, in line with the philosophy of Tri Hita Karana.

During the maintenance stage, farmers continue to rely on natural materials. Organic pesticides are prepared from neem leaves, lemongrass, and tobacco to control pests. According to W.S., the use of natural ingredients is not only an environmentally friendly choice but also a form of respect for ecological balance. Irrigation is carried out regularly by considering weather conditions and the growth phases of the plants.

The seedling and planting processes are conducted organically without the use of chemical fertilizers. Farmers plant chili crops collectively through mutual cooperation, as shown in Figure 1.

Figure 1.
The chili planting process carried out by farmers of Subak Karangasem, Noongan Village

(Source: Researcher's Documentation, 2025)

At the harvesting stage, activities are carried out collectively through the metulung system, which refers to mutual assistance without monetary compensation. After harvesting, part of the produce is sold in traditional markets, part is consumed by the household, and the remainder is set aside as seed for the next planting season. Before the harvested crops are taken home, farmers present canang offerings as an expression of gratitude for the fertility of the land and the cooperation within the community.

In addition to the technical stages, farmers also routinely perform the Tumpek Uduh ritual every 210 days on Saturday Kliwon of the Wariga week. This ceremony is conducted in the agricultural fields with offerings such as bubuh injin, bubuh putih, and bubuh merah to honor Sang Hyang Sangkara, the deity of plants and vegetation. According to I.M.A., this ritual serves as a reminder for farmers to always respect nature

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as a source of life. He stated, "If we do not present offerings, it feels as though we are not appreciating the nature that provides our harvest."

The research findings indicate that chili and tomato farming practices in Subak Karangasem, Noongan Village, are not solely oriented toward production outcomes, but are deeply rooted in cultural and spiritual value systems that shape a sustainable agricultural model based on local wisdom. For the farmers, cultivation activities are not viewed merely as economic endeavors, but as part of a harmonious relationship between humans, nature, and God. These values are reflected in the application of the Tri Hita Karana principle, which guides every agricultural practice to remain aligned with cosmic balance.

The Tumpek Uduh ritual represents one form of farmers' reverence for nature as a source of life. Through this ceremony, spiritual values and ecological ethics are transmitted to younger generations, particularly in fostering gratitude and awareness of the importance of protecting land, water, and plants. This ritual is not interpreted as a form of modern communication, but rather as a long-established cultural practice embedded in Bali's traditional agricultural system. Figure 2 shows farmers presenting offerings in the fields as part of the Tumpek Uduh ritual.

Figure 2.
***Tumpek Uduh* ritual in the agricultural fields of Subak Karangasem, Noongan Village**

(Source: Researcher's Documentation, 2025)

In addition to spiritual values, the subak system also plays important social and ecological functions. Regular meetings (sangkepan) among subak members discuss water management, pest control, planting schedules, and preparations for rituals. This emphasizes that agricultural sustainability in this area encompasses three main dimensions: social, ecological, and spiritual. The balance among these three aspects forms a strong foundation that allows agricultural practices to persist despite the pressures of modernization and changes in commodity patterns.

The local wisdom applied by farmers in Karangasem is in line with the concept of sustainable agriculture promoted by FAO (2023), which emphasizes efficient resource use, ecological preservation, and social empowerment. In the subak context, these three pillars are manifested through the use of organic fertilizers and natural pesticides, water governance based on customary agreements, and traditions of mutual cooperation and deliberation. Altogether, these practices demonstrate how the subak system integrates traditional ecological knowledge with the demands of modern agriculture.

The emphasis on communication and social solidarity in Subak Karangasem's agricultural practices is further supported by the findings of Astuti et al. (2023) on the role of community communication, as well as Dewi and Hartawan (2021) regarding local organizational communication patterns. In addition, the dissemination of knowledge through hands-on practices and traditional documentation aligns with the concept of intergenerational value transmission proposed by Suryani and Putra (2023). In the context of modern agriculture, farmer groups have also begun to utilize digital media to share information on pests, weather, and crop management, as noted by Wijaya and Paramita (2022) in their study on environmental advocacy by farming communities.

In line with the perspective of Belz and Peattie (2012), sustainability is shaped not only by technological innovation but also by the integration of social, cultural, and spiritual values into the economic activities of society. This framework clarifies how rituals such as ngendag tanah, ngelabaan, and ngusaba nini regulate the human–nature relationship both symbolically and

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practically. Through these rituals, farming communities maintain ecological sustainability while simultaneously strengthening cultural identity.

Thus, the findings of this study confirm that agricultural sustainability in Bali is not solely supported by cultivation techniques, but is strongly influenced by living traditional values that continue to be practiced within the community. These traditions function as moral and social guidelines that ensure harmonious relationships between humans and nature are maintained amid the dynamics of global change.

Conclusion

Based on the results and discussion of the study, it can be concluded that chili and tomato farming practices in Subak Karangasem, Noongan Village, Karangasem Regency, represent a clear example of sustainable agriculture grounded in local wisdom. All agricultural processes—from seedling, planting, and maintenance to harvesting—are carried out using natural techniques integrated with spiritual and social values deeply embedded in Subak culture. Analytically, this traditional agricultural system does not stand apart from the concept of sustainable agriculture as formulated by the FAO; rather, it reinforces and enriches that framework. The principle of resource-use efficiency is reflected in the application of organic fertilizers and traditional irrigation-based water management; ecological balance is evident in cultivation processes that follow natural rhythms; and social involvement is realized through mutual cooperation, deliberation (sangkepan), and collective rituals that maintain social cohesion.

The Tumpek Uduh ritual serves as an important medium for sustaining harmonious relationships between humans, nature, and God. This ritual not only strengthens the spiritual dimension of agriculture but also functions as a means of ecological education for younger generations. Through the involvement of children and adolescents in every stage of the ritual, sustainability values are transmitted across generations, ensuring that agricultural practices remain aligned with the living cultural values of the community.

Furthermore, the subak system plays a crucial role as an institution that regulates water governance, agricultural rules, and social relations among farmers. This role ensures that resource management is conducted in a fair, transparent, and participatory manner. The synergy between cultural values, spirituality, and ecological practices positions Subak Karangasem in Noongan Village as a compelling example of how local wisdom can support agricultural sustainability without reliance on modern technology.

Thus, the findings of this study affirm that agricultural sustainability does not necessarily have to originate from technical innovation, but can instead grow strongly from local values that have been tested over time. The traditions passed down through generations in Subak Karangasem, Noongan Village, demonstrate that local wisdom possesses a high adaptive capacity to respond to global challenges, maintain ecological balance, and strengthen the social identity of Balinese society.

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