

Farmer Perspectives on Sustainable Urban Farming Tourism: A Case Study of Bali's Subak Lestari Program

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Abstract: Bali's economic landscape, intricately interwoven with tourism, integrates cultural-urban agriculture via the Subak system. Subak is an organization owned by the farmers in Bali that specifically regulates water management. The government has selected several Subak in urban area to become dynamic agricultural centers named Subak Lestari. The research explores farmer perspectives on urban agriculture tourism and offering insights for future sustainable urban agriculture and cultural tourism. This qualitative study is involving 23 farmers of Subak Lestari management and reflecting scores in technical (4.01), socio-cultural (3.87), economic (4.29), and environmental (4.32) aspects. These assessments underscore confidence in Subak Lestari's potential to catalyze a development in tourism-centric urban agriculture. Farmers seriously support positions of Subak Lestari as a potent force in reshaping urban agriculture. The study advocates for stakeholders to foster a sustainable fusion of traditional agriculture and tourism to safeguard agricultural spaces and ensuring urban farmers existence.

Keywords: subak lestari; urban agriculture; cultural heritage; tourism; farmer perspectives

1. Introduction

The surge in Bali's tourism sector not only triggers a shift in labor from agriculture but also spurs a growing demand for public infrastructure, housing, and tourism-related facilities. This surge, however, results in the conversion of agricultural land into non-agricultural use (Sunarta et al. (2021). The changing economic landscape is evident in the diminishing role of the primary sector (agriculture) in the Gross Regional Domestic Product (GRDP), while the tertiary sector (largely tourism-driven) continues to expand. Windia

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(2018) illustrates this transformation over time. In the 1970s, the primary sector contributed a substantial 54.64% to Bali Province's GRDP, with the tertiary sector following at 40.60%. Fast forward to 2020, and the primary sector share has dwindled to 14.50%, while the tertiary sector has surged to 69.71%. This shift in sectoral dominance raises critical issues in Bali's development, including the pressure on traditional agriculture due to burgeoning population and tourism demands. Challenges in sustaining water resources for agriculture, industry, and tourism, environmental pollution, and exacerbating congestion, as stipulated in Bali Province Regional Regulation Number 10 of 2015 outlining the Master Plan for Regional Tourism Development.

Bali's pursuit of sustainable tourism takes an innovative turn with the development of *Subak*-based Tourism Attractions, a direction poised to integrate preservation within the agricultural sector. According to the Bali Province Regional Regulation No. 9 of 2012, *Subak* (hereafter the word *subak* is not italicised), functioning as a traditional organization, serves multiple roles, including enhancing farmers' productivity and welfare, upholding customary laws through agreed *awig-awig*, and preserving the Subak area and its environment in the context of sustainable agriculture. In alignment with Pitana's definition, Subak is characterized as an organization of wetland farmers drawing irrigation water from a communal source, associated with one or more *bedugul* temples (Pitana 1993). Notably, Subak embodies a unique blend of physical and social dimensions. Physically, it encompasses the rice fields and their irrigation infrastructure, while socially, it represents an autonomous organization of irrigation farmers. This holistic definition captures the essence of Subak, highlighting its integral role in Bali's cultural and agricultural landscape, making it a promising foundation for sustainable tourism initiatives.

Subak, evolving into subak-based tourism attractions, predominantly finds its foothold in rural landscapes, exemplified by Subak Jatiluwih in Penebel Tabanan (Antara et al., 2017) and Subak Pulagan in Tampaksiring Gianyar (Sarita et al., 2013). Both subaks have garnered UNESCO's recognition as world cultural heritage (WBD), amplifying their appeal (Diarta and Sarjana, 2018). This prestigious designation isn't exclusive to Bali; it extends to the Banaue Rice Terraces in Luzon Province, Philippines, which achieved UNESCO world heritage status in 1995 due to its profound cultural significance. Nestled within the Cordilleras region, the Banaue Rice Terraces, part of the Ifugao Indigenous complex, represent a testament to agricultural ingenuity, taking around 2,000 years to carve these terraces into the mountains. Today, they stand as a captivating tourist attraction in the Philippines (Castonguay et al., 2016; Ducusin et al., 2018; Tikkanen, 2023). The global comparison highlights the potential synergy between tourism and agriculture as pillars of community

culture, promising not only social welfare but also significant contributions to cultural and environmental preservation. The combination of these sectors is a promising model for sustainable development, providing a harmonious balance between economic prosperity and the preservation of cultural and natural heritage.

Amid the transformative landscape of tourism during the COVID-19 pandemic, as noted by The Ministry of Tourism and Creative Economy of the Republic of Indonesia in 2021, the industry faces the imperative of adapting to evolving trends. To survive this challenge, it is necessary for tourism and creative economy stakeholders to demonstrate adaptability, innovation, and collaboration. The pandemic has resulted in a shift in people's behavior, resulting in changes in tourism preferences. In the past, tourists travelled freely to destinations in Bali, Indonesia, and beyond. The trend is now focused on safety, with a preference for nature-centric destinations and proximity due to uncertain COVID-19 regulations. Implementing CHSE standards (Cleanliness, Healthy, Safety, and Environmental Sustainability) is crucial for tourism service providers, ensuring visitors' safety, as highlighted by (Hariyono et al., 2022). The desire for secluded vacations has altered tour package services, pushing the industry towards exclusive or mini-group packages to enhance safety and minimize virus transmission risks.

Post-pandemic, tourist destinations that focus on outdoor activities are expected to thrive. The designation of Subak Lestari in Denpasar City offers Subak a unique opportunity. Coupled with supporting amenities such as jogging tracks, the development of Subak should be comprehensive, considering socio-cultural, economic, and environmental aspects. The endeavor, as emphasized by (Junaedi et al., 2023; Putri et al., 2021), aims to position Subak as a post-COVID-19 alternative for open-space and affordable tourism. The development of Subak Lestari as a tourist attraction can provide a promising avenue for a well-rounded and resilient tourism experience in the aftermath of the pandemic.

According to the Denpasar City Agriculture Office in 2022, Denpasar encompasses 41 active Subak lands distributed across four sub-districts and 43 villages. The breakdown includes 9 Subak in North Denpasar, 14 in East Denpasar, 10 in South Denpasar, and 8 in West Denpasar. However, several challenges persist within these Subak areas, including frequent land conversions to non-agricultural use, unclear Subak boundaries, and the absence of standardized Subak areas crucial for determining regional food balance. Comparing the data from (Hutauruk et al., 2015) which initially reported 42 Subak, the recent information from the Denpasar City Agriculture Office reveals a decrease to 41 Subak. The loss of Subak Peraupan Timur in North Denpasar, where the land became exhausted in 2019, has been responsible for this decline, which was

reduced from its previous 2-hectare area in 2018. The designation of five Subak as Subak Lestari holds substantial significance in curbing the conversion rate of agricultural land. This shift towards Subak Lestari is crucial for preserving agricultural spaces. The Denpasar City Agriculture Office's annual comparison data emphasize the importance of addressing these challenges systematically to ensure the sustainability of Subak areas amidst ongoing changes in land use and urban development.

The establishment of five subak as Subak Lestari has had a significant impact on suppressing the conversion of paddy fields for the last seven years from 2015 to 2021. Out of the five subaks, there are four subaks that have a lower percentage of land conversion compared to the total percentage of subak land conversion in Denpasar City as a whole. The change in subak that was drastically reduced in 2019 was due to the difference in the method of measuring subak land using satellite image digitization from the previous one manually in the field. To reduce the rate of conversion of existing rice fields in this subak, cross-sectoral cooperation is needed in strengthening regulations related to land conversion, programs to increase the productivity of agricultural products and innovations in providing added value to rice fields that are still maintained in their current condition.

Researchers in the past have examined changes in subak land use in different regions (Budiasa et al., 2015; Sriartha and Windia, 2015) that have become tourist areas, leading to a decline in the food security of urban areas (Lanya et al., 2017; Lanya et al., 2018; Lanya et al., 2015). The extent of converted subak land poses a challenge for the government and all parties to collectively preserve it (Bhayunagiri and Saifulloh, 2022) so that it is hoped in the future it does not give rise to more complex environmental issues such as air quality pollution (Sunarta and Saifulloh, 2022a), degradation of vegetated land (Sunarta and Saifulloh, 2022b) leading to urban heat island effects (Sunarta et al., 2022) and critical water infiltration causing annual floods (Trigunasih and Saifulloh, 2022a; Suyarto et al., 2023).

Over its six-year trajectory as Subak Lestari, both the positive and negative impacts of the government-initiated program have become evident. Adjustments to policies, grounded in practical insights gained in the field, are essential for the future enhancement of the Subak Lestari program. This research holds significant importance as it delves into the perceptions of farmers, who are direct contributors to the implementation of the Subak Lestari program. This is especially crucial considering the preservation of rice fields, utilized as natural tourist attractions in urban areas. The aim of this study is to delve into farmers' perspectives on urban tourism while also painting a vivid picture of the spatial distribution of urban Subak areas nestled within Denpasar. This

journey promises to uncover the nuanced views of those directly involved in Bali's agricultural and cultural tapestry, offering insights into the dynamic interplay between traditional practices and contemporary urban landscapes.

2. Literature Review

2.1 Perception

The perception refers to the varied opinions individuals hold about the same object. The concept of perception has been extensively explored by experts, who describe it as an internal process through which individuals select and organize stimuli from their external environment (Anggela et al., 2017). These stimuli, perceived through the senses, are spontaneously imbued with meaning by our thoughts and feelings. Murianto (2014) defines perception as the perspective, actions, and mental images individuals attribute to elements within their environment, whether these perceptions are positive or negative. In simpler terms, perception can be understood as an individual's process of interpreting their interactions with the surrounding world. The perception discussed in this study pertains to farmers' attitudes towards the Subak Lestari program as a tourist attraction in Denpasar City.

2.2 Subak Lestari

According to the Denpasar City Spatial Pattern Plan Map (Denpasar City Regional Regulation on RTRW 2021 - 2041), The Subak Lestari area in East Denpasar District is meant to grow food crops, while the Subak Lestari area in South Denpasar District is meant to grow horticultural activities. These designations are used as guidelines to enhance the potential of Subak Lestari as agricultural land that requires preservation. Additionally, as per Mayor's Decree No. 188.45/966/HK/2020, the Subak Anggabaya, Subak Umadesa, Subak Umalayu, Subak Intaran Barat, and Subak Intaran Timur areas have been identified as natural tourist attractions under the ownership of Denpasar City for development purposes. Officially, these five subak areas fall within the Penatih Village and Sanur Kauh Village, recognized as tourist villages in Denpasar City according to Denpasar City Regional Regulation Number 3 of 2019. These five subak areas serve as pilot models for Subak Lestari, with one key consideration being the commitment of subak members to preserve the agricultural nature of the subak areas, particularly rice fields.

Previous researchers conducted studies in the Jatiluwih Subak as UNESCO World Heritage site since 2012 and found that the "subak" system and natural landscapes remained preserved, serving as indicators of tourist satisfaction (Krismawintari and Utama, 2019). In addition to its appeal to tourists, the subak system embodies the concept of Tri Hita Karana, where subak members

perform rituals on auspicious days to pray for good harvests, maintain social harmony through collective decision-making, and preserve the environment. The application of the Tri Hita Karana philosophy aligns with the aspiration for sustainable agriculture (Sukanteri et al., 2021). Based on these previous studies, the researchers are interested in exploring the subak system in urban areas as a means of preserving World Heritage cultural legacies.

2.3 Sustainable Tourism

Sustainable tourism, as defined by Muller's concept (in Pitana, 2005), involves tourism management aimed at qualitative growth, which entails enhancing the welfare, economy, and health of the community. This qualitative improvement can only be achieved by minimizing the negative impact on non-renewable natural resources. Sustainable tourism development is essentially related to business ensures that natural, social and cultural resources are utilized for tourism development in this generation so that it can be enjoyed for generations which will come (Arida, 2017). Sustainable tourism development is a comprehensive and organized endeavor to enhance the quality of life through sustainable utilization and preservation of natural and cultural resources. Achieving sustainable tourism requires a sense of responsibility that avoids damage to nature and culture while respecting the customs of tourist destinations. Sustainable tourism considers present and future economic, social, and environmental impacts, catering to the needs of visitors, industry, the environment, and local communities. The important role of local communities in development of sustainable tourism destinations has encouraged the emergence of a new trend of community-based tourism development it was even emphasized that an important aspect of Sustainable tourism is an emphasis on community-based tourism (Adikampana, 2017). Community-based tourism is tourism development concept compatible with sustainable tourism (Putra, et al., 2015). So that Community empowerment in terms of tourism development is one form of sustainable tourism development. It can be applied across all forms of tourism activities and destinations, including mass tourism and various niche tourism activities (Permenparekraf, 2021).

3. Methods and Theory

This research is a study to reveal the perceptions of farmers in five subaks in urban areas as sustainable subaks. In this research, a qualitative approach was used which was collected through observation, interviews, focus group discussions and surveys of 23 resource persons who were administrators of the five sustainable subaks. The selection of resource persons was carried out deliberately because they are subak administrators who also own land in their

subak area and have roles as *Pekaseh* (Chairman), *Pangliman* (Deputy Chairman), *Petengen* (Treasurer) and *Penyarikan* (Secretary). Survey data were obtained from distributing questionnaires then followed by interviews and focus group discussions to sort, organize and test the validity of the data obtained (Figure 1). The interpreted data is analyzed using the theory of perception as perspectives, actions, and mental images of individuals with certain elements. The perceptions discussed in this research relate to farmers' attitudes towards the Subak Lestari program based on several elements which are described in four variables, namely technical, socio-cultural, economic, and environmental variables.



Figure 1. Documentation of the data collection process involves collaboration with government institutions as policy stakeholders (A), along with interviews conducted with the heads of subak rice field farmer groups in Denpasar City (B) (Documentations: Rusadi, 2023).

The method of descriptive data analysis in this study serves to describe the variables under scrutiny and offer interpretations aligned with the research objectives. The assessed variables include Technical Variables (X1), Socio-Cultural Variables (X2), Economic Variables (X3), and Environmental Variables (X4), measured on an ordinal scale ranging from 1 to 5. Analyzing data with descriptive methods in the form of data weighting which aims to interpret (interpret) the level of importance of each question. The data obtained is then distributed in different categories. Determination of categories is carried out based on certain interval classes using the formula below:

$$i = \frac{\text{Distance}}{\text{Number of Classes}}$$

Description:

- i : class interval
- Distance : highest score value minus lowest score value
- Number of Classes : is the number of classes or categories specified

The assessment in this study has the lowest score value of 1, the highest score is 5 and the number of categories is 5 then, $i = (5-1) / 5$ with the result 0,80, So the score achievement category is described in Table 1.

Table 1. Categories of Achievement of Indicator Scores and Research Variable

No	Score Achievement	Category
1	1.00 – 1.80	Strongly Disagree
2	1.81 – 2.60	Disagree
3	2.61 – 3.40	Undecided
4	3.41 – 4.20	Agree
5	4.21 – 5.00	Strongly Agree

Source: Research Result, 2023

4. Results and Discussions

4.1 Spatial Overview of the Subak Area

This research was carried out in Indonesia on a global scale and in the province of Bali on a regional scale (Figure 2a). From an urban perspective, the study is focused on the provincial capital, Denpasar city, specifically on the subak system (Figure 2b). Denpasar city covers an area of 127.78 km² (2.27% of Bali Province’s total area). Administratively, Denpasar City comprises 4 sub-districts. Among these, South Denpasar is the largest sub-district with an area of 49.99 km². North Denpasar covers 31.12 km², and West Denpasar spans 24.13 km², with the smallest sub-district being East Denpasar at 22.54 km². The case study of the research is spatially located in subak rice fields in East Denpasar (i.e., Subak Anggabaya, Uma Desa, and Uma Layu) and South Denpasar (i.e., Subak Intaran Barat and Intaran Timur), sequentially presented in Figures 2c and 2d.

Geographically, the research location is positioned at coordinates 8°35’32.27’’S - 8°42’24.73’’S and 115°14’30.57’’E - 115°14’0.05’’E. The research area experiences an annual rainfall ranging from 2037 to 2253 mm/yr, with slope inclinations predominantly in the range of 0-8%, and elevations varying between 0-50 meters above sea level. The average air temperature is around 29.8 °C, with the lowest average temperature at approximately 24.3 °C. Geophysically, the research area is dominated by Latosol Yellowish Brown soil type, Alluvial plains landform, and the dominant geological formations are the Buyan-Bratan Group and Batur Volcanics. Along the southern coastal region, the geological formation is primarily Alluvium. In general, the physical conditions of the region are conducive to agricultural activities (Trigunasih and Saifulloh, 2022b; Trigunasih et al., 2023).

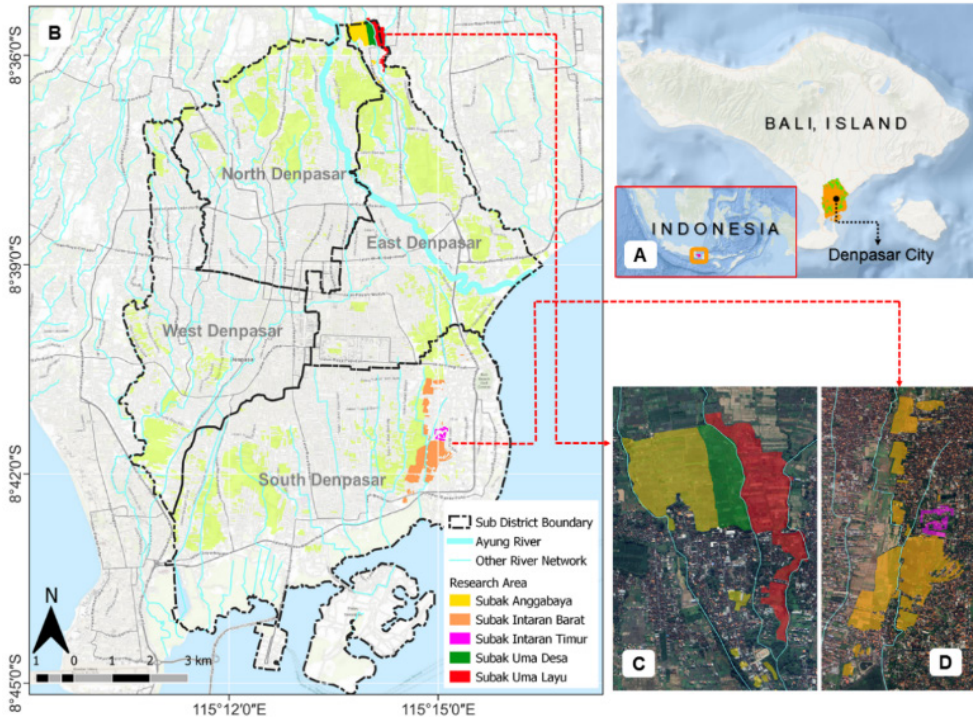


Figure 2. The research location, as viewed on a global scale map, encompasses the Indonesian territory and, on a regional scale, the province of Bali (A). This includes the capital city of Bali Province (Denpasar City) along with the spatial distribution of its subak rice fields (B). For a more detailed overview of the research area, specific attention is given to five sample subak rice fields in Denpasar City (C, D) (Source : Hutauruk et al., 2016)

The overview of the subak landscape in the research area is presented in Figure 2. In urban areas, the potential of subak is relatively pristine, contributing to the preservation of green open spaces and greenhouse gas absorption. Subak activities are not limited to rice farming alone; other activities such as tourism are supported by the presence of jogging tracks. Additionally, local farmers also utilize part of their land for horticultural and fruit farming, thereby increasing their income. This aligns with previous research on subak in Denpasar City.

The presented overview of the subak landscape in the research area offers valuable insights into the role of traditional irrigation systems within urban settings, particularly in Denpasar City. The findings underscore the dual function of subak beyond its conventional agricultural purposes, highlighting its potential contributions to urban green spaces and greenhouse gas mitigation efforts.

One notable aspect highlighted in the overview is the relatively pristine condition of subak in urban areas. This suggests a promising opportunity for leveraging traditional irrigation systems to enhance the ecological resilience of urban environments. By preserving these green open spaces, cities like Denpasar can mitigate the adverse effects of urbanization, such as heat islands and air pollution, while also providing recreational spaces for residents.

Moreover, the inclusion of activities beyond traditional rice farming, such as tourism and horticulture, demonstrates the adaptability and versatility of subak systems (Figure 3). The integration of jogging tracks and other recreational facilities not only enhances the aesthetic appeal of subak landscapes but also promotes eco-tourism and physical well-being among urban dwellers. Similarly, the diversification of agricultural practices to include horticulture and fruit farming not only enriches the local economy but also contributes to food security and dietary diversity.



Figure 3. The condition of subak landscape and agricultural activities in the city of Denpasar (Documentations: Rusadi, 2023).

4.2 Farmers' Perceptions of Sustainable Subak

The data unequivocally indicates a positive mindset among farmers regarding Subak Lestari. The results underscore those farmers from Subak Anggabaya, Subak Umadesa, Subak Umalayu, Subak Intaran Barat, and

Subak Intaran Timur perceive the establishment as Subak Lestari within the high category (4.12). This high perception score suggests that Subak Lestari, implemented in these five locations, is operating effectively, instilling confidence in the sustainability of the program. The robust results are reflected across four crucial aspects: technical, socio-cultural, economic, and environmental. For a detailed breakdown of the perception scores of Subak Lestari farmers, refer to Table 2, which encapsulates the achievements and affirms the positive impact of Subak Lestari on the farming community.

Tabel 2. Level of Farmers’ Perceptions of Sustainable Subak Designation in Denpasar City

No	Aspects	Score Achievement	Category
1	Technical Aspects	4.01	Agree
2	Socio-cultural Aspects	3.87	Agree
3	Economic Aspects	4.29	Strongly Agree
4	Environmental Aspects	4.32	Strongly Agree
Rating Average		4.12	Agree

Source: Research Result, 2023.

Table 2 highlights the remarkable achievement of the highest perception level in environmental aspects, scoring 4.32 in the strongly agree category. This underscores farmers’ profound understanding of their Subak’s crucial role in environmental sustainability, serving as an urban green open space, a vital source of food for the community, and a pivotal area for rainwater catchment to prevent floods. On the other hand, the socio-cultural aspects recorded the lowest perception level with a score of 3.87 in the agree category. This is attributed to the active engagement of subak members in organizational activities since joining, backed by support from government entities such as the Department of Agriculture, Department of Culture, Department of Tourism, and the Department of Public Works and Housing in designating them as Subak Lestari.

In the contemporary urban agricultural landscape, challenges such as land conversion, climate change, globalization, and shifting paradigms among the younger generation pose growing concerns. The economic demands on farmers present a difficult choice between preserving the rich subak culture passed down through generations and seeking alternative paths for a potentially better life (Norken et al., 2015; Norken, 2019; Prastyadewia et al., 2020; Risna et al., 2022; Santosa, 2022; Suryawan et al., 2023). The designation of these five subaks as Subak Lestari serves as a motivational force for subak farmer members, inspiring them to cultivate with the dual aim of enhancing their quality of

life and ensuring the enduring sustainability of the subak. The expectations of subak members after the establishment of Subak Lestari in Denpasar City are expounded upon in technical, socio-cultural, economic, and environmental aspects.

4.2.1 Technical Aspect

The technical aspects in this study encompass the physical conditions of the Subak Lestari application, incorporating the development of farm roads to facilitate subak activities, the construction of farm roads to enhance public visits, the establishment of irrigation channels to fulfill subak needs, the provision of agricultural machinery and agricultural inputs tailored to subak requirements, the renovation of bale subak buildings to support subak activities, and the integration of supporting facilities to enhance the aesthetic appeal of the subak (Djelantik et al., 2023; Sriartha and Giyarsih, 2015). The results reveal that farmers’ perceptions regarding technical aspects fall within the agree category (4.01), indicating a positive mindset toward these aspects, as detailed in Table 3.

Tabel 3. Farmers’ Perceptions of Subak Lestari Based on Each Indicator on Technical Aspects

No	Indicator	Score Achievement	Category
1	Construction of Farmer Business Road (JUT) in supporting subak activities	4.74	Strongly Agree
2	Construction of JUT in increasing the number of public visitors	4.26	Strongly Agree
3	Construction of irrigation canals to meet subak needs	2.91	Undecided
4	Provision of agricultural tools (Alsintan) and machinery and production facilities (Saprodi) in accordance with the needs of subak	4.17	Agree
5	Renewal of the Bale Subak building to support activities of krama subak	4	Agree
6	Supporting facilities to improve the aesthetics of Subak	4	Agree
Farmers' Perceptions based on technical aspects		4.01	Agree

Source: Research Result, 2023

Table 3 further highlights farmers' perceptions based on technical aspects, with the highest indicator being the construction of Farmer Business Road (JUT) to support subak activities, scoring 4.74 in the strongly agreed category. The farmer's business road has significantly improved the farming process, providing convenient transportation for agricultural products. Farmers now have access to bring two-wheeled and even four-wheeled vehicles, reducing reliance on manual labor for transportation and saving time and energy.

However, the indicator with the lowest score pertains to the construction of irrigation channels meeting subak needs, scoring 2.91 in the doubtful category. This skepticism is influenced by the subak's heavy reliance on water from upstream subaks, particularly subak Natak Tiyis in Denpasar (Norken et al., 2015). Development activities, especially housing projects in subak neighborhoods, further impact water sufficiency for farming. Subak members in Intaran Barat and Intaran Timur have proactively built boreholes to address water needs during the dry season (Gao et al., 2019; Ustriyana et al., 2021; Sedana and Rahmat, 2020). Farmers' expectations for Subak Lestari based on technical aspects include:

- a. Ensuring optimal functionality of irrigation system infrastructure in the Subak Lestari area.
- b. Coordinating cross-government efforts to manage the water flow required for subak members to irrigate their rice fields.

Moreover, utilizing jogging track arrangements within subaks can potentially boost farmers' income (Dimastari and Ariawan, 2023). Subak Lestari development can involve transforming subak areas into trekking zones, where residents pay *Punia* funds (at a specified price) for trekking, managed by the subak or utilizing institutions. This revenue-generating approach mirrors the successful *Peken Carik* model implemented in Subak Sembung (Darmawan et al., 2021; Wijayanti et al., 2020).

4.2.2 Socio-cultural Aspects

The socio-cultural aspects examined in this study encompass various elements such as the socialization of the Subak Lestari program, the government's role in communicating the benefits of Subak Lestari, the existence of government regulations reinforcing subak land preservation, the attention of local village governments in Subak Lestari, cross-sectoral agricultural support to subak, the emergence of young people's interest in agriculture, and the presence of a training program for subak administrators in managing tourist destinations. The detailed breakdown is presented in Table 4.

Table 4. Farmers’ Perceptions of Sustainable Subak Based on Each Indicator on Socio-Cultural Aspects

No	Indicator	Score Achievement	Category
1	Socialization of the Subak Lestari program	3.91	Agree
2	Government explains the benefits of Subak Lestari	4.22	Strongly Agree
3	Government regulations to strengthen the preservation of subak land	4.17	Agree
4	Attention from the local village government in Subak Lestari	4.26	Strongly Agree
5	Cross-sectoral support for subak agriculture	3.61	Agree
6	Emerging interest of the younger generation in agriculture	3.09	Undecided
7	Tourism destination management training program for subak administrators	3.83	Agree
Farmers' perceptions based on socio-cultural aspects		3.87	Agree

Source: Research Result, 2023

Table 4 reveals that the highest indicator score is achieved in the statement regarding the attention of the local village/kelurahan government in Subak Lestari, scoring 4.26 in the strongly agree category. This underscores the crucial role played by the village/kelurahan government, particularly in Sanur Kauh Village and Penatih Village, in collaborative efforts such as mutual cooperation work programs for irrigation channels, extending the paving of farm roads, and other supporting initiatives like the formation of a Tourism Awareness Group to synergize agricultural programs with existing tourism potential.

Conversely, the lowest indicator pertains to the statement regarding the emergence of the younger generation’s interest in agriculture, scoring 3.09 in the doubtful category. The development of Subak Lestari as a tourist attraction has not yet shown a significant impact on increasing the younger generation’s interest in entering the field of agriculture. Data collected from 266 Subak Lestari members across five subaks indicate that only about 12% are aged >30 to 45 years, and there are no subak members aged <30 years. The younger generation, such as students or college students, tends to visit for sports or educational activities with relatively short durations.

Expectations of Subak Lestari farmers based on socio-cultural aspects include (Linda et al., 2018):

- a. Additional knowledge about the development of the Subak Lestari program, with a desire for thorough socialization and comprehensive information provided by the government to all subak members.
- b. Increased awareness in the wider community to maintain subak sustainability and prevent land conversion through the establishment of rules/awig-awig for land conversion.
- c. Increased government attention, particularly tangible forms of assistance to enhance land productivity, a guarantee of irrigation water availability, social interaction to listen to farmers’ aspirations and opinions, farmer-to-farmer extension programs, and scholarship opportunities for the children of poor subak members who excel academically within the Subak Lestari area.

4.2.3 Economic Aspects

The economic aspects under scrutiny in this study focus on the benefits accrued by farmers from an economic standpoint. These include the existence of Farmer Business Roads (JUT) to enhance subak farmers’ productivity, direct government assistance for ceremonies and aci to subak, a government-sponsored rice harvest purchase program in Subak Lestari, a tax fee exemption program for productive green land in Subak Lestari, fertilizer assistance to alleviate the burden on farmers, and the establishment of Subak Lestari contributing significantly to income growth. Farmers’ perceptions based on economic aspects indicated a strongly agree category (4.29), as detailed in Table 5.

Table 5. Farmers’ Perceptions of Subak Lestari Based on Each Indicator on Economic Aspects

No	Indicator	Score Achievement	Category
1	JUT increases productivity of subak farmers	4.83	Strongly Agree
2	Direct assistance from the government for ceremonies and aci to subak	4.61	Strongly Agree
3	The existence of a rice harvest purchase program by the government in Subak Lestari	3.35	Agree
4	Tax exemption program for productive green land in Subak Lestari	4.61	Strongly Agree
5	The assistance of fertilizers eases the burden on farmers	4.65	Strongly Agree
6	The establishment of Subak Lestari provides a significant increase in income	3.79	Strongly Agree
Farmers’ perception based on economic aspects		4.29	Strongly Agree

Source: Research Result, 2023

Table 5 highlights the highest indicator score in the statement concerning the existence of Farmer Business Roads increasing the productivity of subak farmers, scoring 4.83 in the strongly agree category. The economic impact is evident, as the existence of farm roads reduces farmers' expenses, particularly in crop transportation. Before the existence of farm roads, farmers relied on hired laborers for transportation, incurring daily wages of Rp. 75,000 to Rp. 125,000 per person. With farm roads, farmers can conveniently access harvest locations with motorized vehicles and transport inputs and agricultural needs more easily.

Conversely, the lowest indicator pertains to the statement about the government's rice harvest purchase program in Subak Lestari, scoring 3.35 in the agree category. Despite farmers' strong support for this policy as a price guarantee for their crops, practical challenges arise. Farmers prefer selling to middlemen who provide capital assistance before planting, facilitating the farming process. Although middlemen offer lower prices than the market, farmers opt for this route.

Expectations of Subak Lestari farmers based on economic aspects encompass:

- a. Additional knowledge about the Subak Lestari program's economic development, requiring comprehensive government socialization.
- b. Increased awareness within the wider community to maintain subak sustainability and avoid land conversion.
- c. Greater government attention, involving tangible assistance to enhance land productivity, irrigation water availability guarantees, social interaction to understand farmers' aspirations, farmer-to-farmer extension programs, and scholarship opportunities for deserving students from the Subak Lestari area.

4.2.4 Environmental Aspects

The environmental aspect under investigation in this study signifies that the Subak Lestari program exerts a positive impact on environmental enhancement (Sardiana and Wiguna, 2023). This encompasses the adoption of organic farming practices, maintaining subak land for perpetual agricultural use, functioning as a green open space in urban areas, producing food for the community, generating oxygen, and serving as a rainwater catchment area. The data reveals that farmers' perceptions based on environmental aspects fall into the strongly agree category (4.32), as detailed in Table 6.

Table 6. Farmers’ Perceptions of Sustainable Subak Based on Each Indicator on Environmental Aspects

No	Indicator	Value Achievement	Category
1	There is guidance that leads to organic farming	3.78	Agree
2	Keeping subak land in perpetuity for agriculture	3.87	Agree
3	As an urban green space	4.57	Strongly Agree
4	As a field to produce food products for the community	4.61	Strongly Agree
5	As a producer of oxygen for people's life	4.52	Strongly Agree
6	As a rainwater catchment area	4.57	Strongly Agree
Farmers' Perceptions based on Environment Aspects		4.32	Strongly Agree

Source: Research Result, 2023.

Table 6 illustrates that the highest indicator score pertains to the statement about subak land producing food products for the community, scoring 4.61 in the strongly agree category. Subak management continues to believe in the principle that what is planted can be harvested, ensuring the sufficiency of rice harvests to meet their families’ daily food needs. The realization that their rice fields can fulfill their rice consumption without the need to purchase from the market is significant. It raises concerns about potential dependence on rice imported from outside the region if agricultural land continues to decrease. To maintain the subak environment’s productivity and food production for the community, anticipation is required. Conversely, the lowest indicator lies in the statement about the existence of guidance leading to organic farming, scoring 3.78 in the agree category. Although farmers recognize the positive impact of organic farming, they find the technical implementation challenging. The condition of land, water, and air in Subak Lestari, as a downstream subak potentially contaminated from the upstream subak, adds complexity to adopting the organic farming system. Farmers also express difficulties in handling fertilization and plant pest control within the organic farming framework.

Denpasar City, as Bali Province’s capital, plays a crucial role in developing environmentally friendly agriculture-based tourism. The Subak Lestari program is envisioned to create a sustainable tourist attraction aligned with the program’s action plan. While Subak Lestari aims to guide farmers toward environmentally friendly practices, it faces a dilemma due to being a downstream subak and *Natak Tiyis*, reliant on water sources from upstream that struggle with chemical pollution. In this environmental aspect, the establishment of Subak Lestari is

anticipated to transform remaining agricultural land into perpetual green open spaces in urban areas, functioning as vital areas for producing food, oxygen, and serving as rainwater catchment areas integrated into educational eco-tourism activities.

5. Conclusion

The scientific work emphasizes the imperative need to preserve Subak, recognized as a world cultural heritage in Bali, through the establishment of Subak Lestari, transforming it into a sustainable and environmentally friendly urban tourism area. The discussion centers on key aspects contributing to the preservation and sustainability of Subak as a green open space.

The establishment of Subak Lestari is acknowledged as a crucial initiative to maintain and enhance the ecological and cultural significance of Subak. The program addresses challenges posed by urbanization, climate change, and economic shifts. Through various indicators such as technical, socio-cultural, economic, and environmental aspects, the study explores the perceptions of Subak farmers and their expectations for the program's impact.

The technical aspects encompass physical conditions and infrastructure development, including the construction of farm roads, irrigation channels, and supporting facilities. Farmers exhibit positive perceptions, particularly towards initiatives like Farmer Business Roads, which ease transportation and enhance productivity. However, challenges in maintaining sufficient water supply and the need for cross-sectoral cooperation are highlighted.

Socio-cultural aspects delve into the role of the government, community awareness, and the involvement of the younger generation. Farmers express appreciation for local government support but express concerns about the limited interest of the younger generation in agriculture. Recommendations include increased socialization and government attention, fostering awareness, and educational programs to engage the youth in preserving Subak's cultural values.

Economic aspects scrutinize the benefits reaped by farmers, such as the impact of Subak Lestari on productivity, government assistance, and the rice harvest purchase program. Positive perceptions prevail, especially regarding the role of Farmer Business Roads in reducing expenses. Challenges, however, arise in the implementation of government programs, with farmers favoring middlemen due to immediate financial support.

Environmental aspects explore the positive impact of Subak Lestari on environmental sustainability. Farmers acknowledge Subak's role in producing food, generating oxygen, and functioning as a rainwater catchment area. While organic farming guidance receives a lower score due to technical challenges,

the overall impact on preserving Subak as an environmentally friendly urban tourism area is considered positive.

In essence, the scientific work concludes that the establishment of Subak Lestari is a significant step toward preserving Subak as a world cultural heritage in Bali. By addressing technical, socio-cultural, economic, and environmental aspects, the program contributes to the sustainability of Subak as a green open space, ensuring its continued significance as a cultural, ecological, and tourism asset in the urban landscape. The study underscores the importance of ongoing efforts, collaboration, and adaptive policies to safeguard Subak for future generations.

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