Integrating Sustainability in Active Street Frontage: Strategic Planning for Ubud's Tourism Development

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Abstract: Active Street Frontage (ASF) in Ubud, Bali, poses a critical role and challenge due to the tourism destination development. ASF strongly linked with environmental conservation, social-culture, and economic activity. This paper explores strategic planning for integrating sustainability into ASF to support high-quality tourism destination in Ubud. Utilizing a case study approach, the research focuses on examining basic formulation and identifying strategic measures to ensure the quality of Ubud street frontage. This research found the importance of integrating sustainability aspects within ASF to create a socially-dynamic, attractive, vital, and ecological-friendly destination. Very important to maintain the quality of the place (aesthetic form, meaning, and activity) along with environmentally friendly, social stability, and economic vitality in Ubud. The findings indicate that a holistic, community-based approach significantly enhances collaboration in ASF development, ensuring alignment with local cultural values and environmental preservation. The study emphasizes the pivotal role of local eco-friendly materials, such as bamboo and natural stone and the importance of green space that also create uniqueness identity of ASF Ubud. These local materials not only reduce environmental impact but also foster a sense of pride and connection to our cultural heritage. Recommendations are provided for stakeholders to foster sustainable urban planning and incentives for fostering the sustainable ASF.

Keywords: Active Street Frontage, eco-friendly, sustainability, strategic-planning, tourism, Ubud, Bali

1. INTRODUCTION

The Ubud area, Bali, is one of the leading tourist destinations offering a unique combination of local culture and international tourism (Bappeda, 2021; Krista, 2023). As tourism grows, the need to preserve the environment is increasingly urgent. Active Street Frontage (ASF) has essential contribution in creating attractive and environmentally friendly public and shared spaces (J. Jacobs, 1992). Still, the development of an ASF that does not pay attention to sustainability principles can disrupt the environmental, economic and social balance. Therefore, the sustainable oriented planning of ASF is not just important, but urgent in planning the Ubud tourism area. This article aims to identify planning strategies that can integrate sustainability aspects into ASF design in the Ubud area.

Ubud, located in the middle of the island of Bali in Gianyar regency, has long been known as a tourist destination that combines the richness of local culture with natural beauty. Ubud become Bali's first international tourist destination because its well-known beauty of landscape, art, and ritual (MacRae, 1997). According to the Bali Provincial Tourism Office (BPS Provinsi Bali, 2022), Ubud attracts more than 15% of foreign tourists visiting Bali, making it one of the most significant tourist areas on the island. Tourism in Ubud is booming, but this growth also presents new challenges related to environmental impacts, land use, and pressure on local infrastructure. In other side, Ubud's highest attractor for tourist are physical and cultural motivation (Putri & Abdillah, 2019; Sari & Zuraida, 2019). Integrating

sustainability concept on ASF is one way to make more optimal use of existing shared spaces along street that provide a better tourism experience while supporting environmental and cultural sustainability.
ASF refers to a livable quality of street frontage that emphasizes the interaction between public and commercial spaces along the street, thus creating dynamic and sustainable social activities and vibrant place (Fyfe, 2006; Gehl, 2011; Moughtin, 2003; Yoojin & Chong, 2017; Ziad et al., 2019) . However, ASF development that does not pay attention to sustainability can lead to environmental and place identity degradation, lack of sense of place, deterioration of air quality, and triggered congestion, especially in tourism hubs such as Ubud, which are crowded with tourists activities and commercial activities.

Based on data from the Bali Central Statistics Agency (BPS Provinsi Bali, 2022), Ubud has experienced an increase in the number of tourists by up to 7.8% every year. This growth has impacted the need for public facilities that can accommodate tourists while maintaining the balance of the local environment and culture, which is the main attraction of Ubud. This shows the urgency of integrating sustainability principles in public space planning, especially ASF, to support sustainable tourism development. The urgency of this research is based on three main factors: 1) overtourism tendency that lead place quality degradation, 2) environmental degradation, and 3) socio-cultural imbalance effected from imported culture from tourist. Ubud experiences an uncontrollable increase in tourism. Ubud has experienced a surge in tourist visits in the last decade. However, adequate infrastructure has not matched this increase, especially in public space management and transportation systems (Dewi & Nawastara, 2015; Nyoman Trisna Kurniawan, 2022; Widyantara, 2015)

The massive development of tourism support facilities and accommodation in Ubud has led to significant landscape changes, increased carbon footprint, and damage to natural resources and local ecosystems. According to reports (Budhiana, 2024; Suarjana, 2023) around 30% of green land in Bali, including Ubud, is reduced due to massive development. This development tends to be uncontrolled, with unplanned macro impacts on regional areas. Sustainability is related to the environment, economic as well as social and cultural aspects (Strezov et al., 2017). The development of an ASF character as a public space strongly linked with community's place (Hauge, 2007; Muktiwibowo & Laskara, 2018; Qazimi, 2014; Wang & Chen, 2015). ASF that does not pay attention to this aspect can erode local identity and cause social conflicts in the people of Ubud. The loss of identity and character on ASF erodes the sense of community and ownership of collective memory.

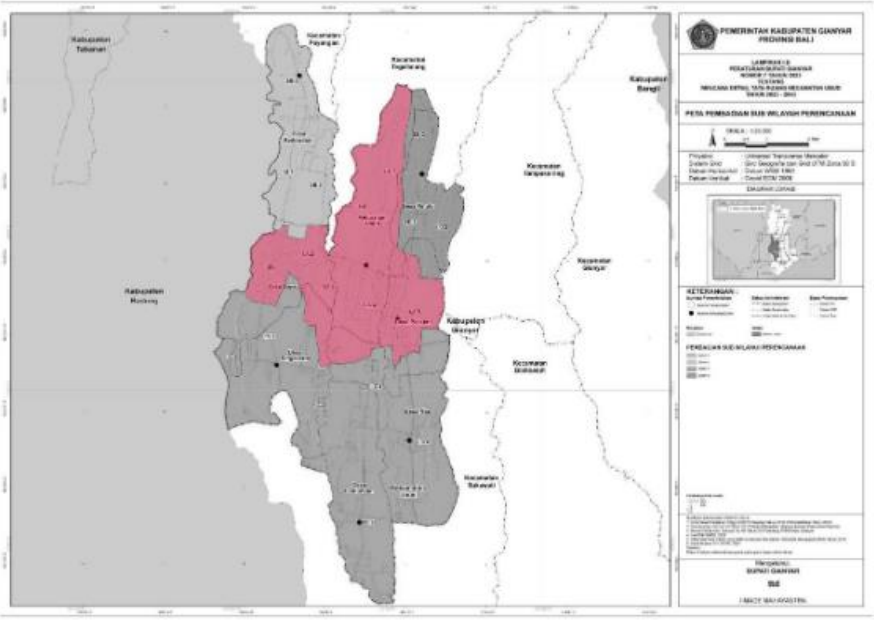


Figure 1. Ubud Tourism Area
Source : RDTR Kecamatan Ubud Tahun 2023-2043 (Gianyar, 2023)

Based on the background and urgency described, this study focuses on formulating the following problems: How can the concept of sustainability be integrated into the planning of ASF in the Ubud tourism area? What are the critical challenges in implementing strategic planning for sustainable ASF in Ubud? How can sustainable ASF development support sustainable tourism in Ubud?

This study aims to:

1) Identify sustainable design elements that can be integrated into the development of ASF in Ubud.
2) Analyze the challenges and opportunities in strategic planning that support sustainability in ASF in Ubud.
3) Provide strategic recommendations for stakeholders in the sustainable development of ASF as part of efforts to support sustainable tourism.

This paper strength provides a basic approach needed to integrating sustainability in ASF design and planning, particularly in the context of Ubud, Bali, which is a significant contribution due to the region's unique cultural and environmental characteristics. The study effectively utilizes a case study approach, which allows for a detailed examination of the interaction between strategic planning and public space design. Furthermore, the paper emphasizes the use of local and eco-friendly materials, which not only supports environmental sustainability but also aligns with the local cultural values of Bali. The research provides actionable recommendations for stakeholders, making it highly practical and relevant for architects, urban planners and policymakers.

While many studies have explored sustainable tourism planning in Bali, there is still a gap in the literature regarding the specific application of sustainability in ASF planning in Ubud. Some research examines ASF as a livable shared space that encourage walkability and sustainability in order developing vibrant place along main roads in urban areas (Ewing et al., 2015; McAllister, 2021; Simpson et al., 2019; Zordan et al., 2019). Still, no study has focused on tourist areas such as Ubud, which have very different cultural and environmental characteristics.

This paper contributes significantly to sustainable urban planning and vibrant street by providing a novel approach to integrating sustainability within ASF in a culturally rich context like Ubud. The study fills a gap in the literature by addressing the specific application of sustainability principles in ASF, particularly in tourism-driven economies. Doing so offers valuable insights that can be applied to other regions facing similar challenges. This research offering an approach that focuses on the local context, primarily cultural and ecological influences, in the integrating sustainability principles on ASF in the Ubud tourism area.

2. LITERATURE REVIEW

Active Street Frontage as an Important Component of Livable and Sustainable Development

Active Street Frontage (ASF) theory was first introduced by (Gehl, 2011) in his book Life Between Buildings. Gehl argues that well-designed public spaces, especially in street areas, can increase social interaction, improve people's quality of life, and encourage economic activity. ASF is a design approach that places buildings with an open orientation towards the street, enabling visual and physical connectivity between indoor and outdoor spaces (Dumbaugh & Gattis, 2005). The main goal is to create vibrant and interactive pedestrian-friendly environment that is visually appealing and supports sustainable commercial activities. A livable and a success place will create sense of place for people that contains visually attracted physical form, vibrant activity, and meaning attachment and its perception (Montgomery, 1998)

ASF also plays a vital role in creating high walkability (Hermawan & Laskara, 2022; McAllister, 2019; Moughtin, 2003), which, according to (Gehl, 2011), can increase social activity by up to 60%. In addition, this design can encourage sustainability by walkability oriented planning that reducing the use of private vehicles, reducing carbon

footprints, and supporting biodiversity and green mobility in tourism areas (Rafiemanzelat et al., 2017; Ujang & Muslim, 2015; Zainol et al., 2011). This concept suitable for cultural tourism area such as Ubud.
ASF is an essential component of success urban design that can integrates sustainable development in various aspects, including economic, environmental, and social dimensions that support city sustainability (Rafiemanzelat et al., 2017). This concept aims to create a dynamic and interactive shared space that improves the quality of life while encouraging sustainable development that has direct impacts on economic, environmental, and social aspects (Heffernan et al., 2014; Kickert, 2019).

From an economic perspective, ASF significantly contributes to the economic vitality of urban areas by fostering a dynamic and attractive environment that encourages pedestrian activity and local business engagement. Transparent storefronts, operable entrances, and outdoor dining areas enhance aesthetic appeal and increase the desire to pay for better street facilities (McAllister, 2021; Yoojin & Chong, 2017)

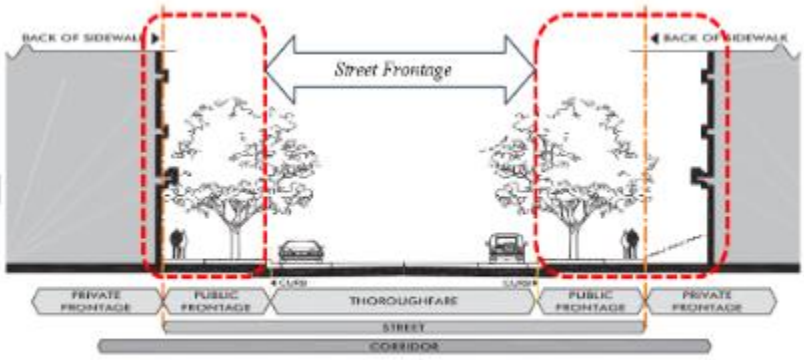


Figure 2. Street frontage elements
Source : Adaptation (Gehl, 2011)

Studies have shown that improving pedestrian routes can significantly increase economic benefits. For example, a 2020 study by the Transport Agency New Zealand found that trees or plants on the road can increase the desire to pay by 20%, while sheltered pedestrian routes can improve it by 28%. Similarly, the Ashburton City Centre streetscape renewal project in New Zealand saw an increase of 40% or more in pedestrian willingness to pay due to better landscaping and broader pedestrian walkways (Corbett-Davies & Abley, 2024).

In the environmental aspect, ASF also plays a vital role in achieving ecological sustainability. By incorporating natural landscape, green infrastructure and promoting pedestrian-friendly spaces, these facades can reduce ecological issues such as noise pollution, rainwater runoff, and the heat island effect (Abdulmawla et al., 2022; Moughtin, 2003). Beautiful and shady pedestrian ways, a unique and aesthetic diversity of vegetation that is vital element for ASF on tropical climate. Various vegetation, colors, and aromatic flowers along the road and pedestrian paths and drainage system creates a vibrant atmosphere. This approach beautifies urban landscapes and provides many environmental benefits, including rainwater management and carbon emission reduction. For example, the design of green roads in Medan involves planting between 20% to 30% of the street space, improving the urban-ecological complex, and reducing urban ecological damage (Fachrudin et al., 2023).

In the social aspect, ASF is very important for social sustainability because it facilitates interaction between pedestrians and places and increases a sense of community and security (Dover & Massengale, 2013; A. B. Jacobs, 1993). The presence of ASF increases natural surveillance, reduces the fear of crime, and enhances safety measures in the surrounding environment. Local community participation in designing their urban communities is essential for social sustainability. ASF encourages community engagement by providing spaces for social interaction, such as cafes and open-air exhibition activities. This integration helps create a neighborhood that meets local needs and allows

residents to adapt and manage their built environment according to their changing needs (Loper et al., 2022; Shekfa & Ahmed, 2022).

According to the (UNWTO, 2005), sustainable tourism is "managing all resources in such a way that economic, social, and aesthetic needs can be met while maintaining biodiversity, essential ecological processes, life support systems, and cultural heritage." This concept underlies the importance of balancing tourism development and preserving the local environment and culture.

Sustainable tourism, especially in cultural tourism destinations, is a multifaceted approach that integrates economic vitality, social stability, and environmental sustainability. The concept aims to preserve local cultural heritage while promoting sustainable development, ensuring that tourism activities benefit local communities and protect the environment (Angelevska-Najdeska & Rakicevik, 2012; N K A Dwijendra et al., 2020). Sustainable tourism in cultural destinations prioritizes the integration of three dimensions: economic growth, social justice, and environmental protection. This holistic approach ensures that tourism activities generate positive economic benefits for local communities while respecting social and cultural norms and minimizing ecological impacts (Hall, 2000; Jing & Loang, 2024; Syafi'i & Suwandono, 2015; Wijaya, 2014).

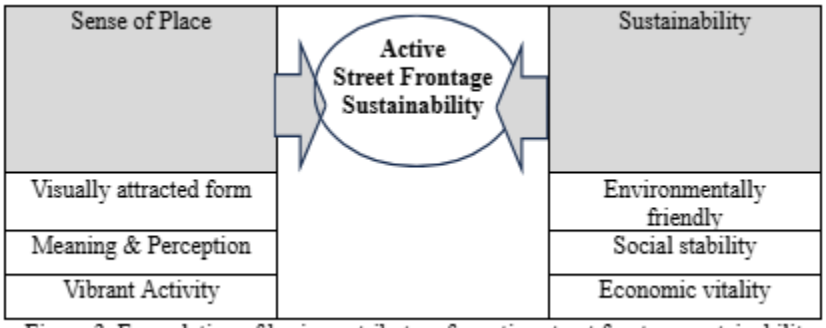


Figure 3. Formulation of basic contributors for active street frontage sustainability

Sustainable principles in the context of ASF planning involves various criteria, such as 1) using environmentally friendly materials, 2) energy efficiency; and 3) contextual green space. Sustainable ASF design must use local and renewable materials that easily found around the site. This material will have a low carbon footprint, and also durable with the site climate (Ngakan Ketut Acwin Dwijendra, 2019). Energy efficiency, buildings, and infrastructure along the ASF must be designed and construct efficiently to minimize energy consumption and carbon footprint. Energy efficiency can be achieved by applying environmentally based design and energy-saving technologies, such as energy-saving lighting or natural ventilation systems (Toh, 2022). Green space in ASF can function as a heat trap, improve air quality, filter noise, and create a more attractive visual experience for tourists and local communities (Anak Agung Ngurah Aritama, Gede Windu Laskara, 2022; Femy et al., 2017). In Ubud, this concept has become very relevant, considering that the area relies on unique cultural and natural attractions. Ubud street frontage applied local green space concept called Telajakan, that creates many local identity and environmental benefit for sustainable ASF (Adhika & Putra, 2020; Kato et al., 2017, 2019). Therefore, implementing designs that are in harmony with the local environment and culture is essential to maintain the sustainability of tourism in this region.

ASF principles are essential in maintaining and enhancing sustainable cultural tourism, those principles creating dynamic public spaces encouraging walkability, visually attracted places, community engagement, collaboration and artistic preservation (Asriana, 2021; Laskara et al., 2023). ASFs with transparent storefronts, frequent openings, windows and attractive signage contribute to a dynamic and interactive environment that enhances visitors' creative experience. This transparency encourages "eyes on the street" encouraging pedestrian activity and social interaction, which is essential for a rich cultural experience (A. B. Jacobs, 1993; Laskara et al., 2020; Law et al., 2020)

ASF also facilitates community engagement by providing space for social interaction. For example, incorporating façade design can give a sense of unity and diversity, encouraging community participation in cultural activities and events. By preserving traditional architectural elements and integrating them into modern design, ASF can help preserve cultural heritage. For example, restoring old gathering places for locals and tourists can preserve cultural facilities and redesign existing functional spaces to form cultural areas, the significance of cultural tourism innovation in enhancing tourist experiences and promoting authenticity (Jing & Loang, 2024).

Figure 4. Ubud Street Frontage
Source : (Sun, 2023)

Studies on the application of Active Street Frontage in sustainable tourism are still limited. Still, some studies show that proper strategic planning can reduce negative environmental impacts while maintaining the attractiveness of tourist areas. In his research, (Jones, 2019) entitled Sustainable Tourism and Active Street Frontage Design: Challenges and Opportunities in Tourist-Driven Economies, highlights the importance of strategic planning focusing on sustainable design. Jones found that integrating renewable energy and using recycled materials can reduce the carbon footprint of tourist areas by up to 25%. In addition, green spaces incorporated into ASF can increase the comfort of tourists while improving air quality in urban areas. The study also emphasizes the need for a more holistic approach to ASF planning, where the involvement of local communities and industry players is critical to successful implementation.

Another study by (Beatley, 2011) in his book Biophilic Cities: Integrating Nature into Urban Design and Planning shows that integrating ecology in urban spatial planning can improve people's welfare. According to Beatley, environmentally friendly ASF design contributes to environmental preservation and the community's quality of life by creating a healthier, beautiful, and functional environment. This approach is particularly relevant for the Ubud region, where residents and tourists highly value the harmony between the natural environment and local culture. Successful implementation of ASF in tourist areas such as Ubud requires a holistic approach. This means that every element, from economic booster to social and ecological integration, must be considered to create an environment that functions well and is in harmony with the local nature and culture. Research by (Newman & Kenworthy, 1999) in Sustainability and Cities: Overcoming Automobile Dependence shows that reducing dependence on motor vehicles

through strategic planning of public spaces can reduce greenhouse gas emissions by up to 30%. In the context of Ubud, implementing pedestrian-first ASF can contribute to reducing pollution and congestion and supporting greener mobility. Overall, this literature review highlights the importance of implementing sustainable design to develop Active Street Frontage in tourist areas. Previous researches by showed that integrating the concept of sustainability into the design of public spaces not only provides ecological but also economic and social benefits. In the context of Ubud, applying these concepts will support sustainable tourism development, maintain the attractiveness of local culture, and ensure environmental sustainability.

3. METHOD

This research uses a case study approach chosen because of its relevance in analyzing specific phenomena in an accurate and in-depth context (Yin, 2018). The case study is considered appropriate for exploring how sustainability can be integrated into the design of Active Street Frontage (ASF) in the Ubud tourism area. Through this approach, the research can explore in detail the interaction between strategic planning and public space design and challenges and opportunities in applying sustainability in the region. Case studies also provide flexibility in combining various data collection methods to obtain a comprehensive understanding, including interviews, observations, and document analysis (Craswell, 2014). The Ubud area was chosen because of the challenges in maintaining a balance between tourism development, environmental preservation, and local culture. This study uses qualitative methods, which involve several data collection techniques to obtain in-depth and contextual information about the sustainable implementation of ASF in Ubud. The following are the data collection methods used:

Semi-structured interviews were chosen because of their flexibility in digging into in-depth information while allowing respondents to explain their views (Kvale & Brinkmann, 2015)

1. Interviews were conducted with registered architects and city planner to understand the technical and aesthetic aspects of the ASF design, and also to obtain information on policies and regulations related to the development of ASF in Ubud. Interviews also to Tourism industry players to understand the needs and expectations from an economic point of view and how they manage their building façade that can increase tourist attraction. The questions focused on the challenges, opportunities, and experiences in designing and implementing sustainable aspect on their property on the street frontage.
2. Field observations were conducted to observe firsthand how ASF appearance in Ubud. Researchers observe building façade and its design, which is how buildings along the street interact with public spaces. Use of green spaces: How natural elements such as trees, parks, or green open spaces are integrated into the design—social and economic activities: Tourists and locals utilize street spaces that function as ASF. Non-participant observation is used, in which the researcher is not involved in the observed activity but notes the phenomenon that occurs (Spradley, 1980).
3. The document's analysis was used to review policies related to ASF's spatial planning and development in Ubud. The records analyzed included local government regulations related to the management of public spaces and sustainable tourism in Ubud, spatial studies, and environmental reports published by local agencies. The study of this document serves to obtain information related to regulations and policies that affect ASF's planning and development in the Ubud tourist area.

After the data was collected, this study used thematic analysis to identify the main patterns in the qualitative data. Thematic analysis is a technique used to organize and interpret data by finding recurring themes or patterns in interviews, observations, and documents (Braun & Clarke, 2006). The stages of analysis include:

1. Data obtained from interviews and observations are encoded using an open coding method, where each relevant piece of data is assigned a specific label or category (Strauss & Corbin, 1998). These codes represent critical themes related to sustainability in ASF design, such as using place theory and sustainable theory that linked to ASF. Also found that environmentally friendly materials, green spaces, and energy efficiency are critical aspect.

2. Identify themes after coding, the next step is to group the codes into broader themes. These themes reflect critical issues faced in implementing sustainable ASF in Ubud, such as regulatory challenges, local community engagement, and design innovation.
3. Interpretation is carried out by connecting the themes found with the theoretical framework and concept of sustainability discussed in the literature review. Triangulation is carried out by comparing the results of interviews, observations, and documents to ensure the validity of the data (Denzin & Lincoln, 2011).

To ensure the validity and reliability of the research, several steps are taken:

1. Triangulation method: This study combines interviews, observations, and document analysis to ensure that the data comes from various sources, providing a richer and more in-depth perspective (Patton, 2002).
2. Member checking: After the interview, the results and interpretation will be reconfirmed with the respondent to ensure that the researcher's interpretation is based on the respondent's original views (Craswell, 2014).

Although the case study approach provides in-depth insights, this study's results are limited to the context of the Ubud tourism area. They may not be broadly generalized to other regions in Bali or Indonesia. In addition, obstacles to collecting field data, such as weather and access to certain areas, need to be anticipated.

4. RESULT AND DISCUSSION

Based on the comprehensive analysis of the data collected from observations and interviews, strategic planning were obtained that integrate sustainability in the ASF in tourism area of Ubud through the matrix description below. The strategic planning emphasizing eco-friendly local material, green space, energy efficiency that creates physical ambience for sustainability on ASF in Ubud.

Table 1. The matrix of strategic planning on integrating sustainability principles in Ubud's ASF

	Visually attracted form	Meaning & Perception	Vibrant Activity
Environmentally friendly	Using unique and eco-friendly local materials that represent Ubud and its nature landscapes	Emphasizing Ubud's green space *telajakan*, the diversity of natural landscape as a tourist experience at ASF	Eco-vibrant that implement smart system technology to promote energy efficiency, and green infrastructure
Social stability	Local culture and its architecture identity as basic guidelines for the design of building façade and frontage	Maintaining local culture, social and traditional spaces as a top priority above tourism activities.	Cultural activities that carried out at ASF area engage tourist's contributions and community collaboration
Economic vitality	Innovative and creative design with flexibility, durability and easy maintenance as main aspect	Socio-cultural activities that attract tourism must provide benefits and profit to the local community	The diversity of commercials and attractive retails activities that supporting walkability, that prioritized local enterprise

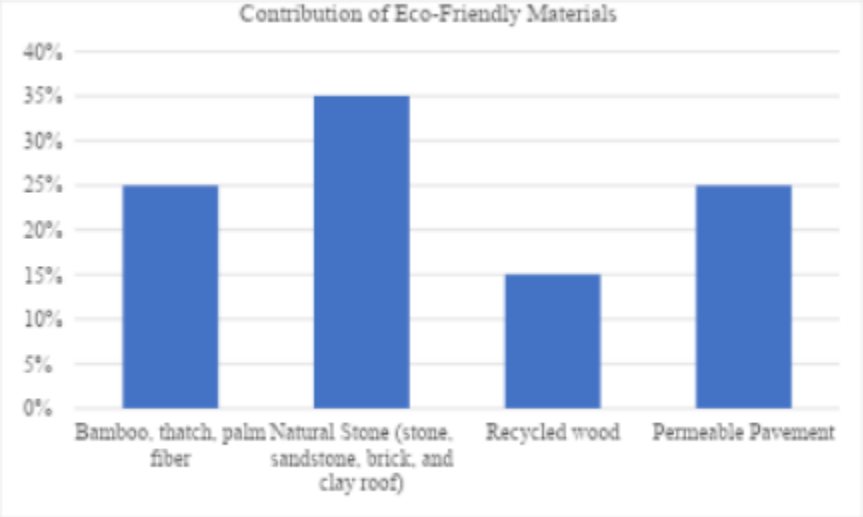
Further studies, based on interviews with 25 (twenty-five) architects and planners in Ubud, it was found that one of the essential components in creating sustainable and also unique ASF in Ubud is the use of locally-produced and environmentally friendly materials, such as bamboo, thatch, palm fibers (ijuk), various natural stone, and also recycled materials. Their decision also considered Bali's building design regulation for building appearances materials and style, and also imagining the presence of space experiences (shades of Ubud) in the design of tourist accommodation ASF through the architect's knowledge of the nuances of Ubud (Primadewi et al., 2021). This situation supports environmental sustainability and aligns with Bali's local cultural values, which consider nature part of spirituality and daily life in Ubud.

The following are the observation data related to the materials used in the application of ASF in Ubud:

Table 2. Local and Environmentally Friendly Materials in ASF in Ubud

Material	Usage (%)	Environmental Benefits
Bamboo, Thatch, Palm Fibers *(Ijuk)*	25%	Local vegetation, fast-growing, and renewable materials
Natural Stone - Stone, Sandstone, Brick, Clay Tile and Roof	35%	Local production and reduces carbon emissions because no need for long delivery
Recycled wood	15%	Reducing waste, bring a specific ambient, and sustainable resource utilization
Permeable pavement	25%	Improves water absorption and reduces rainwater runoff

In addition, creating traditional green spaces (telajakan) along the ASF is essential in improving air quality, reducing overheating, and providing a refreshing atmosphere for tourists and residents. It's found about 30% of the building façade on the main road frontage area has been equipped with green space. And it's about 40% of the building façade on the secondary road frontage has been equipped with green space. This green space such as of telajakan, small gardens, shade trees, and hanging or removeable vegetation, these all which also serve as microclimate controllers. Here is a graphic showing the contribution of materials and green elements in ASF design in Ubud:



Graph 1. Contribution of Eco-Friendly Materials on ASF in Ubud

In addition to planning with environmentally friendly materials, the use of technology has also been carried out. Energy-saving technologies such as energy-saving LEDs and solar panel technology are used for garden lighting in the terrace area. The ASF area has adopted rainwater management through permeable paving and bioswale/biopharma. This model reduces energy consumption, improves water efficiency, and repels potential local flooding. Water management is heritage aspect of Bali, while traditional irrigation system and drainage called subak inspires water management, such as gutter system below the pedestrian way on ASF (Geria et al., 2023).

Table 3. Efficiency of the Use of Environmentally Friendly Technology in ASF in Ubud

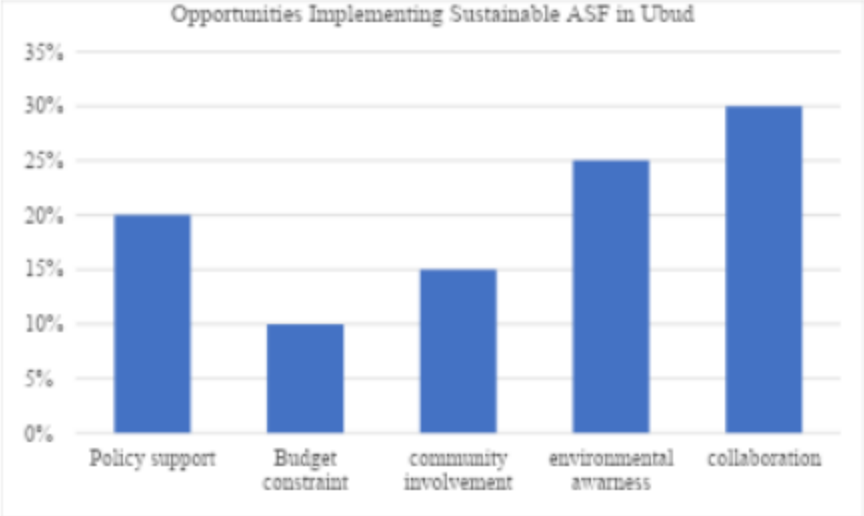
Technology	Environmental Benefits	Implementation
Electricity Energy-Saving	Reduce energy consumption	LED Lighting, Solar panel lighting on the signage media and green space
Rainwater Management System	Improves water absorption and reduces runoff	Absorbability pavement surface and biophory box
Protect Natural Contour & Vegetation	Reduces landscape changes and carbon emission	Keep natural contour and existing trees

The results of interviews with tourism industry stakeholders and local peoples in Ubud show that the active participation of local communities in the ASF planning process has proven to be very effective. Most respondents emphasized that involving indigenous peoples in design decisions ensures that ASF projects align with local cultural values and do not disrupt social balance.

Challenges and Opportunities of Sustainable ASF Planning in Ubud Tourism

According to the results of interviews with tourists, using local and natural materials in designing ASF in Ubud, Bali, significantly improves the design character and sense of identity for international tourism. These materials reflect Bali's identity and cultural heritage and contribute to environmental sustainability. Balinese architecture is famous for using natural materials such as bamboo, wood, and stone. These materials are not only pleasing to the eye but also sustainable. For example, bamboo buildings in Bali have been around for centuries and are now innovatively integrated into modern design to preserve cultural traditions while adapting to contemporary needs.

Incorporating local materials such as bamboo and wood in ASF in Ubud gives tourists in Bali, especially Ubud, a sense of identity and a sense of place. In addition, the use of local materials reduces dependence on non-renewable resources and minimizes environmental impact. This approach is in line with the principles of sustainable development, which emphasize the importance of preserving the natural environment and cultural heritage. Although the potential for implementing sustainable design in ASF is significant, several challenges exist. One of the main challenges is the lack of incentives support from public policy from relevant stakeholders. Some tourism industry stakeholder stated that policies related to incentives or a reward for environmentally friendly projects are still limited. Meanwhile, the cost of adopting green technologies such as energy-efficient lighting and technological rainwater management systems is still relatively high.



Graph 2. Opportunities in the Implementation of Sustainable ASF in Ubud

Graph 2 shows the challenges and opportunities in implementing sustainable Active Street Frontage (ASF) in the environmental aspects of Ubud. This graph showcases factors such as policy support, budget constraints, community engagement, environmental awareness, and collaboration and their contribution to the successful implementation of sustainable ASF in the region. The graph above shows that collaboration between the government, local peoples, and the tourism industry is the most incredible opportunity to overcome the existing challenges. In addition, increasing environmental awareness among global tourists is also a driver for the development of a more environmentally friendly ASF. The following features a sustainable Active Street Frontage (ASF) design in Ubud, using natural eco-friendly material that create sustainability also uniqueness to ASF Ubud. This image shows the integration of eco-friendly materials in architecture with green spaces to create an environment that supports sustainability.

Figure 5. ASF Ubud that applied eco-friendly material and green spaces creates ASF uniqueness and sustainability

Figure 5 shows how using materials such as bamboo and natural stone has succeeded in creating a visually accessed space that is not only aesthetically pleasing but also environmentally friendly while providing an atmosphere that is in line with the character of Balinese culture. Integrating local and natural materials and green technology in designing

ASF in Ubud, Bali, significantly increases the sense of place for tourists. Although there are challenges related to cultural sensitivity to the application of new technologies and environmental impacts on the excessive exploration of natural materials, these challenges can be overcome through collaborative actions and innovative solutions based on local principles and contexts. By respecting local customs while adapting to modern needs, urban architects and designers can create a sustainable environment in the ASF area that attracts tourists while preserving Bali's cultural heritage.

While the study presents a strong case for sustainable ASF strategic planning in Ubud, some limitations must be acknowledged. Firstly, the research primarily relies on qualitative methods, which may not capture the full scope of the quantitative impacts of ASF design. Secondly, the case study approach, while in-depth, limits the generalizability of the findings to other regions outside Ubud or similar cultural contexts. Moreover, there is a need for a more detailed analysis of the cost implications of the proposed sustainable practices, which could affect their feasibility and adoption.

5. CONCLUSION

ASF is a multifaceted concept that integrates sustainable development in all economic, environmental, and social dimensions. Various aspects of ASF design in Ubud support these principles by encouraging pedestrian activities, improving environmental quality, and encouraging community participation. These highlight the importance of integrating sustainability aspects within ASF to create a dynamic, attractive, vital, and sustainable destination. The strategic planning sustainability ASF matrix (Table 1) showed that its is very important to maintain the place quality (aesthetic form, meaning, and activity) in line with three main aspect of sustainability (environmental friendly, social stability, and economic vitality) on Ubud tourism area.

ASF makes a significant contribution to the overall sustainability of tourism destination areas. The use of local materials and eco-friendly technology is the key to the success of sustainable design in Ubud. Implementing these aspects requires collaborative support to achieve sustainable ASF success in the Ubud tourist area. This research successfully answered the formulation of problems related to the integration of sustainability in the design of Active Street Frontage (ASF) in Ubud, Bali. Based on the results and discussion, the conclusions that can be drawn are as follows:

1. Use of eco-friendly materials: Local materials such as bamboo, thatch, palm fibers, and various natural stones have proven effective in creating sustainable ASF designs. This material not only supports environmental sustainability but is also in harmony with the local cultural character of Bali, answering the formulation of problems related to sustainability in the context of Ubud tourism. Using recycled materials and permeable technology in ASF reduces carbon footprint and improves energy efficiency.
2. Creation of green spaces and traditional garden: The study results show that the green spaces integrated in ASF, such as gardens and shade trees, contribute significantly to Ubud's environmental quality. This helps reduce overheating, improve air quality, and create more comfortable public spaces for tourists and local communities. This garden strengthens the concept of Balinese traditional gardens in the street frontage area known as the telajakan. In addition, the types of trees in Ubud give a characteristic tourist destination in a tropical climate. This gives a specific impression of the atmosphere of Ubud for tourists who come from non-tropical climate countries.
3. The role of local community participation: The active participation of traditional leaders (puri), indigenous communities, and local communities in ASF planning is crucial for successfully implementing sustainable development. The role of indigenous leaders and communities ensures that the concept of ASF in Ubud can be passed on to the next generation using traditional instruments and customary rules. This participation helps to preserve Balinese cultural values and ensures that tourism development does not disrupt the social and artistic balance. It also provides solutions to the challenges faced in the ASF strategic planning process.
4. Application of green and energy-saving technology: Using environmentally friendly technologies such as energy-saving LED lighting systems and rainwater management through permeable paving has been proven

to improve energy efficiency and environmental management in public spaces, especially in the road surface area in Ubud. This shows that sustainable technological innovation can be effectively integrated into ASF design.

5. Challenges and opportunities: The main challenges in implementing sustainable design in ASF in Ubud are strong policy support and high budgets to adopt green technologies. However, significant opportunities are seen in collaboration between the government, indigenous leaders/communities, and tourism industry players, which can encourage the creation of sustainable ASF design. This answers questions related to the obstacles faced in implementing sustainable ASF.

Based on the conclusions of the study, several suggestions can be given to stakeholders to support the sustainable development of ASF in Ubud, namely:

1. Policies that support sustainable principles and have Ubud's natural and cultural identity. Local governments need to strengthen policies supporting sustainable design implementation in developing ASF design guidelines in Ubud. This guideline must emphasize the importance of Ubud's sense of place such as material, landscape, innovative and creative design that suitable socio-cultural aspects. This includes incentivizing developers to use environmentally friendly materials and energy-efficient technologies. Regulatory enforcement is essential to ensure that the control of the development and preservation of the local environment and culture is maintained and represented in the ASF in Ubud.
2. Increased awareness and collaboration: Tourism industry stakeholders, urban planners, and local communities must be more aware of implementing sustainable design in ASF. Collaboration between these parties is essential to ensure the successful implementation of environmentally friendly ASF aligned with social, cultural, and economic needs. The government must also play an active role in facilitating this collaboration through discussion forums and training programs.
3. Priority use of green and natural technology: Green and environmentally friendly technology should be a priority in any ASF development project. Green technology refers to the technology and management system of natural resource developed from locally-handed technology, to enhance tourist experience as Ubud known as cultural tourism destination. Prioritizing the role of nature and local community contribution in providing comfort for tourism. Governments and developers should invest in smart system and green technologies like green building concept, biophilic concept, smart lighting, green mobility, and efficient water management systems like subak system in innovative way. This technology has been proven to reduce environmental impact, small amount of waste and carbon emissions toward smart cities and tourism (Casini, 2017), and most importantly improve the quality of public experience in Ubud.

Furthermore, a study on community participation in ASF planning in Ubud is needed. Research on how local community participation can be more deeply integrated with the ASF planning process in Ubud and other tourism areas, primarily related to increased Indigenous people's involvement in public space design and management decisions, is needed. Future research could benefit from incorporating quantitative methods to complement the qualitative findings, providing a more holistic understanding of the impacts of sustainable ASF planning. Additionally, expanding the study to include comparative analysis with other regions would enhance the generalizability of the results. Exploring the economic feasibility of sustainable practices in ASF design in more depth would also be beneficial, as it would address one of the critical challenges identified in this study. Lastly, further engagement with policymakers could help translate the study's recommendations into actionable policies.

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