



Green architecture in tourism sustainable development a case study at Laweyan, Indonesia

Sri Yuliani & Wiwik Setyaningsih

To cite this article: Sri Yuliani & Wiwik Setyaningsih (27 Nov 2023): Green architecture in tourism sustainable development a case study at Laweyan, Indonesia, Journal of Asian Architecture and Building Engineering, DOI: [10.1080/13467581.2023.2287198](https://doi.org/10.1080/13467581.2023.2287198)

To link to this article: <https://doi.org/10.1080/13467581.2023.2287198>



© 2023 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group on behalf of the Architectural Institute of Japan, Architectural Institute of Korea and Architectural Society of China.



Published online: 27 Nov 2023.



Submit your article to this journal 



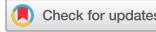
Article views: 724



View related articles 



View Crossmark data 



Green architecture in tourism sustainable development a case study at Laweyan, Indonesia

Sri Yuliani ^a and Wiwik Setyaningsih ^b

^aArchitecture Department, Faculty of Engineering, Universitas Sebelas Maret, Surakarta, Indonesia; ^bSustainable Architecture Research Group, Universitas Sebelas Maret, Surakarta, Indonesia

ABSTRACT

The degradation of local culture is often a consequence of tourist kampung development. However, Laweyan stands out as an example where a tourist village was developed while successfully preserving both the environment and local culture. The research aims to formulate a strategy that promotes a green environment by exploring the potential characteristics of local cultural heritage and emphasizing sustainable preservation. By utilizing an exploratory descriptive method and analyzing the potential and characteristics of the area, the study identified several strategies for developing cultural heritage areas in tourism kampung. These strategies include promoting green communities, establishing green open spaces and infrastructure, implementing green waste management, adopting green transportation, prioritizing green water practices, incorporating green building techniques, and utilizing green energy sources. The implementation of green architecture is one of the key factors for success in sustainable village development. The concept of green architecture involves integrating building design and the environment with the aim of maintaining a balance between quality development and environmental preservation. The successful implementation of these strategies relies on a collaborative social approach that raises awareness and encourages active participation from both the community and the government in preserving the authenticity of the local culture.

ARTICLE HISTORY

Received 29 May 2023

Accepted 20 November 2023

KEYWORDS

Cultural conservation; green environment; sustainable development; tourism-kampung

1. Introduction

The research conducted in Laweyan, Indonesia focused on developing sustainable tourism kampung (urban villages in cities of Indonesia) while preserving local culture and promoting environmental sustainability. Green architecture aims to create buildings that are not only environmentally responsible but also provide comfortable and healthy living and working environments. By integrating sustainable practices, green architecture contributes to the overall goal of achieving a more sustainable and resilient built environment. **Preservation or conservation of cultural heritage** is a global issue that has long been of international concern through UNESCO (UNESCO 2012). So far, the existence of historical areas including cultural values that have high cultural meaning and historical consistency has not been handled and managed optimally. Tourism planners tend to exploit and marginalize local communities at the expense of developing a diversified economy (Haigh 2020).

Preservation of historic areas in urban architecture is one of the attractions for the tourism sector. The carrying capacity of historical areas for sustainable tourism requires an implementation strategy that is seen from the aspects of policy/regulation, institutional, financial,

technological and cultural, along with the framework and details of the main performance indicator system (Pan et al. 2018). The prospect of tourism's potential to contribute to transformative changes in historic areas, therefore, needs to be reviewed from various disciplines in investigating the interrelationships between culture, ecology and energy more broadly. Therefore, without proper sustainable conservation efforts, an area will lose its history and identity that can connect the story of the present with the past.

Kampung (urban village) is a visual area in Indonesia's urban landscape, consisting of traditional settlements that developed as a result of urban expansion, and seemed trapped in the dynamics of urban development and turned into urban kampung (Nur'aini 2017; Putra, Horne, and Hurley 2019;). Tourism kampung is an area or kampung that has unique advantages and local wisdom (physical and non-physical), packaged as a unique tourist attraction, highly competitive, managed, and presented attractively and attractively. Developing harmonious tourism support facilities and good and integrated management do this. The complex relationship between tourism and heritage is revealed in the tension between tradition and modernity. Four

challenging issues in linking heritage and tourism include interpretation, marketing of built heritage, heritage planning, and interdependencies between heritage tourism and local communities (Nuryanti 1996a). Therefore, the concept of kampung tourism with green tourism through sustainable conservation is one of the best solutions in the integrated development of the tourism sector towards sustainable development.

By regulation, the development of tourist kampung is in line with the mission of the city of Surakarta "Solo's past is Solo's future", as a city of culture and tourism through optimizing tourism potential, policies to preserve, develop and appreciate the values of local wisdom as national identity (Surakarta 2019). The development policies of the city of Surakarta include focusing on priority tourism programs and cultural preservation based on the Tourism Law of 2010 (Kepariwisataan 2010; Surakarta 2012) through the development and improvement of the potential for uniqueness and local wisdom, one of which is Laweyan Batik Tourism Kampung, Surakarta. This is further strengthened by the Decree of the Minister of Tourism of the Republic of Indonesia Number: KM.70/UM.001/MP/2016 Determination of National Vital Objects in the Tourism Sector which declares Laweyan Batik Tourism Kampung as a Cultural Conservation Area in Central Java with the manager of the Kampung Batik Laweyan Development Forum assignment from Municipal Development Planning Agency of Surakarta.

Pratomo et al. (2006) argued 35 ancient buildings in the Laweyan kampung area have the potential to be preserved because they have cultural values. In detail, it is explained that based on the assessment of cultural meaning criteria using the weighting method, 80 buildings were studied, of which 19 buildings have a high potential level to be preserved through preservation, 16 buildings have a moderate level of potential through conservation, and 45 buildings have a less potential level to be preserved so that rehabilitation/restoration can be carried out (Pratomo and Antarksa Hariyani 2006). While related to changes in the function of the settlement function of the Laweyan Batik Tourism Kampung, research findings have been obtained that there has been a very large change from the function of the building as a residence to shifting towards the function of living and working (Trišić et al. 2021). This shift in function will certainly have an impact on the environmental burden of the Laweyan kampung area, where the community works with waste that can pollute the environment, not to mention the activities that develop in tourism-related activities. In addition, the dynamics of urban development will certainly affect the development of the kampung as part of the city (Prayitno and Qomarun 2007), including the kampung of Laweyan batik tourism.

The Laweyan Batik Tourism Kampung area is included in the Laweyan District, Laweyan Kampung, located on the banks of the Jenes River, which was an important means of transportation during the Pajang Kingdom. Historically, Pajang Kampung is the location of the founding of the Pajang Kingdom with its famous king Sultan Hadiwijaya/Joko Tingkir (Nur'aini 2017); to the south, it is bordered by the Kabanaran River, where the Kabanaran River is a trade transportation route that connects the city of the Kingdom of Pajang with Nusupan on the banks of the Solo River; while the eastern part is limited by the Bumi Kampung.

During the 1960s, the Laweyan area experienced a prosperous period for its batik industry, with most of the land being utilized for activities related to batik production. The Laweyan kampung area was divided into two main settlements: one for the batik producers and the other for the workers. This area, known as the Laweyan Batik Tourism Kampung, holds historical significance in Surakarta and is designated as a Cultural Conservation Area. It gained recognition as the birthplace of the national movement for the Islamic Trade Union, initiated by Kyai Haji Samanhudi in 1912. This union was the first trade association to be established by batik producers and traders, representing the indigenous community. Preserving the Laweyan Batik Tourism Kampung is an endeavor aimed at managing cultural resources to safeguard their historical, architectural, cultural, and traditional values, all of which contribute to the overall quality of human life.

However, at present very few studies discuss the development of the Laweyan batik tourism kampung in the context of sustainable development. Meanwhile, sustainable development is in many ways the fundamental basis of tourism. The important role of sustainable tourism development in the 21st century is relevant to environmental certification and the support of responsible tourism facilities with a green concept (Trišić et al. 2021) Sustainable urban development in Indonesia currently needs to be oriented towards kampung development (Roychansyah and Diwangkari 2009). Likewise with the sustainable development strategy for batik tourism kampung, until now there have not been many studies that recommend a tourism kampung development strategy with the concept of green tourism through sustainable conservation towards a green environment in Surakarta City, thus causing the absence of government and public policies that pay attention to development eco-friendly tourist kampung.

Based on the background and significance mentioned, this research aims to formulate strategies for sustainable development in a tourist village through the implementation of green architecture. Several fundamental strategies identified from various studies can serve as initial considerations for identifying

development strategies in Laweyan. The research delves into the potential of batik as a livelihood for the community, the characteristics of local cultural heritage, and emphasizes sustainable environmental preservation.

2. Material and methods

The research location focuses on historical areas in the tourist kampung of Laweyan Surakarta, Indonesia. The Laweyan area is a batik tourism area, which is one of the tourist destinations in the city of Surakarta. The location selection is based on the potential of the area that contains the value of local wisdom, culture and history, related to the existence of the Surakarta Palace as a cultural tourism destination and a symbol of the cultural center that still exists.

The Laweyan Batik Tourism Kampung area has several artifacts that still exist and is well preserved, as shown in [Figure 1](#), including the Tomb of Kyai Ageng Henis and his mosque, Bandar Kabanaran, Tugu Pasar, langgar Merdeka, as well as several houses of batik skipper, which tend to be oriented towards Javanese culture influenced by the shape of foreign buildings by highlighting straight and curved lines (Indisch). This batik skipper's house tends to double as a residence

and home industry for batik crafts. The area of each house-building plot tends to be very large (1000 m^2 – 3000 m^2) and high (8–10 m). The large size plots of the batik skipper's houses have an average area of 1000 m^2 to 3000 m^2 , medium sizes have an average area of 300 m^2 to 1000 m^2 , and small sizes have an average area of 25 m^2 to 100 m^2 . Usually around it, there is an open space as an area for drying batik.

This study uses qualitative methods through data collection techniques through observation and interviews. Research analysis was carried out by induction to formulate a strategy for developing historic areas based on sustainable environmentally friendly principles. Observation data is the identification of potential studies of local wisdom in regional spatial planning, while interview data leads to mapping the characteristics of the socio-economic potential of culture and behavior settings with a green-environment approach. Informants in the study are representatives of local communities with different roles through purposive sampling and snowball in the period 2017–2022, by using participatory observation method.

The participatory observation method in Laweyan involves the researcher actively participating in and closely observing the local community and environment. This approach enables the researcher to directly

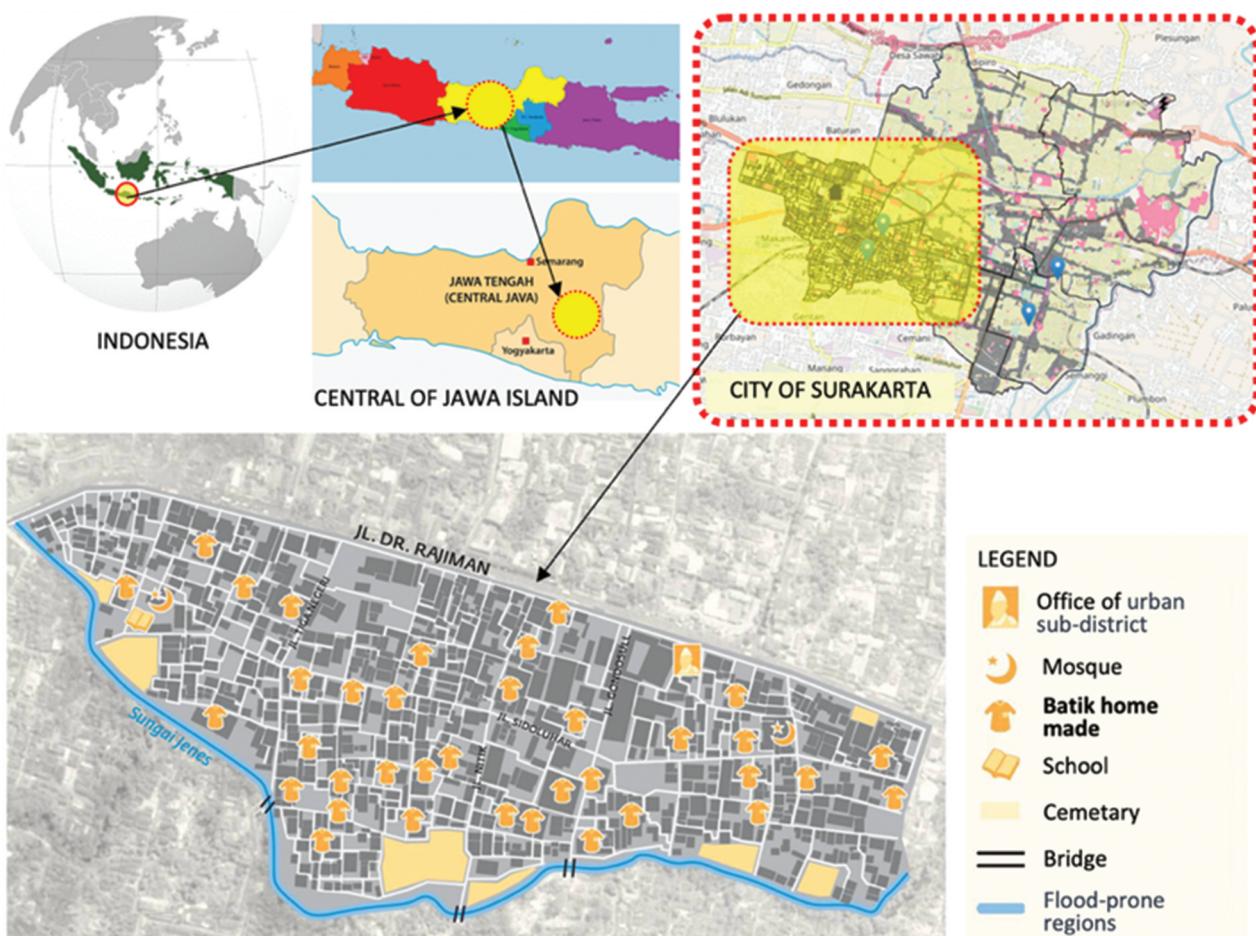


Figure 1. Location and profile of research area.

engage with the daily life of the community, cultural events, and sustainable practices that are undertaken by the local residents. Through participatory observation, a more profound comprehension of how the interactions among the community, environment, and culture take place can be achieved.

3. Results

The concept of protecting historical buildings and areas must be seen as a building process that involves various parties related to the utilization of existing potentials and resources for the benefit of the wider community (Prayitno and Qomarun 2007). There are seven cultural meanings to analyse the weighting of the sustainable preservation of historic buildings, based on variables of cultural significance in the Laweyan Batik Tourism Kampung area. Table 1 shows the results of the research analysis with cultural meaning variables.

3.1. Application for Laweyan Batik Tourism Kampung towards a green environment

The concept of a green environment involves efforts to protect the environment by transforming certain areas into natural green spaces. This aims to establish a harmonious relationship between the natural world and humans, including their tools and technologies. The goal of creating a green environment is to achieve

a balance and a comfortable living environment for both humans and nature. **Implementing the green environment concept in urban areas** is considered one of the simplest and most suitable methods for maintaining ecological equilibrium. However, it requires widespread environmental awareness within communities, encouraging reforestation initiatives starting from individual households. By carrying out small-scale reforestation efforts in every home, a kampung area can be transformed into a green environment. In the Laweyan Batik Tourism Kampung area, three key components of the green environment concept were identified: spatial planning, waste management, and community empowerment.

The Laweyan Batik Tourism Kampung area is characterized by a grid-like spatial arrangement, with a straight line running parallel to the Kabanaran River at the rear, and another parallel line to Jl. Dr. Rajiman serving as the primary access to the main entrance. Within this grid pattern, there are several clusters of residences for batik masters situated in the central and northern parts of the area, while the settlements of batik workers are located in the southern region, along the banks of the Kabanaran River. Currently, the Laweyan Batik Tourism Kampung area is undergoing transformations and shifts in terms of spatial configuration, building structures, environmental aspects, and functional usage. It was originally a center for the batik industry, occupying historic buildings, but now it has

Table 1. Analysis of the weighting of the sustainable preservation of historic buildings, based on variables of cultural significance in the Laweyan Batik Tourism Kampung area.

Cultural Meaning	Assessment of the sub-determining variables	Consideration
Aesthetics	The shape, structure, layout, style, and ornament of the building	Aesthetics/architecture relates to the value of aesthetic and architectural beauty (shape, style, structure, layout, and ornaments), especially in terms of the external appearance of the building/facade, or part of the area/city representing special achievements or certain historical styles.
Variety	Shapes, decorations, special/specific types, as symbols of cultural traditions	The benchmark of plurality is determined in the form of a specific variety or special type. How far the object of preservation will represent a variety, a specific type, or symbolize a cultural tradition
Scarcity	The shape, type, age, and style of the building	A type of work that represents the remnants of the last legacy of a style that represents its era, which is not owned by other regions including its uniqueness and visual luxury.
Extraordinariness	The form and value of the special style or uniqueness and rarity of the building	In connection with the value of privilege/specificity, uniqueness, and scarcity of buildings that are potential as regional landmarks, perhaps as the only remaining, oldest, or prominent placements. Based on elements such as rarest, oldest, largest, longest, and first of its kind
Historical Roles	The value, age, and history of the building	The role of history (historical value) is related to historical values /events that are owned, related to the symbolic history of the development of the city, architecture, and the struggle of the nation, the history of regional development, and the history of urban development.
Building Originality	Structure, value, age of the building, degree of change in the original shape of the building (outside/inside, facade, elements)	Concerning how big the level of change that occurs (physical form outside/inside the building, either through increasing or decreasing the amount of space, structural elements, construction, ornament details)
Maintenance	Physical condition and function of the building	Regarding the physical condition of the building (level of damage, percentage remaining, and cleanliness; empty/unoccupied but in good condition, or damaged and neglected)
Strengthen the area	The influence of the existence of the building on the surrounding area (shape, style, scale & proportion of the building)	Concerning the influence of the presence of the object of preservation on the surrounding area which is very meaningful to improve the quality and image of the environment (formed by the plurality, unity, continuity, or contrast of buildings). The building can be a reference for city residents or a regional landmark



evolved into a multifunctional area with mixed-use purposes. The land utilization pattern in the Laweyan Batik Tourism Kampung area includes a combination of residential and commercial spaces (such as batik showrooms and both batik and non-batik industries), as well as additional facilities to support tourism, such as homestays, coffee shops, and public toilets. This indicates a tendency for the Kampung Batik Laweyan Tourism Area to undergo changes in its spatial pattern due to alterations in the area's function, as well as shifts in the behavior and culture of the local community.

Good waste distribution has also been seen in the Laweyan area. The Ndalem Tjokrosoemartan building, which has a dual function as a residence and a batik factory, already has sewer pipes that are good for channeling batik waste to the wastewater treatment plant, and for housing, it is also channeled following the drainage channel. In addition, the placement of the rainwater drainage pipe from the roof has also been properly arranged to flow into the drainage channel.

The Laweyan Batik Tourism Area has a community association called the Laweyan Batik Tourism Kampung Development Forum, which has carried out several program activities to improve local facilities in the development of Laweyan Batik Tourism Kampung towards a green environment. The Laweyan community has taken various ways, among others, by building attention, sensitivity, and/or public concern to preserve friendly areas, especially in public facilities or public services. The persuasive way to build and maintain these public facilities is through socialization, campaigns, and providing demonstrations or displays in public areas. Socialization: This involves engaging with the community on a personal level, sharing information, and creating a sense of belonging. By organizing workshops, meetings, and events related to green practices and the importance of preserving public facilities, you can provide opportunities for community members to learn and discuss these topics. Through open conversations, people can better understand the benefits of maintaining a green environment and how their actions contribute to the larger goal. Campaigns: Well-designed campaigns can capture the attention of a broader audience and create a sense of urgency around environmental conservation. Develop creative and impactful campaigns that highlight the significance of public facilities, such as clean parks, well-maintained roads, and proper waste disposal. Use various mediums, including posters, social media, and community gatherings, to spread the message and encourage participation. Consider involving local influencers, community leaders, and even school programs to amplify the campaign's reach. Providing visual demonstrations and displays

in public areas can be a powerful way to showcase the positive impact of proper facility maintenance and a green environment. For instance, set up interactive displays that illustrate the difference between a well-maintained space and a neglected one. Showcase before-and-after images, share success stories, and emphasize the positive outcomes that a clean and green environment can bring to the community.

4. Discussion

To realize sustainable conservation towards a green environment in the development of tourist kampung areas, it is necessary to consider various cross-disciplinary aspects of cultural heritage and environmental conservation, one of which is the impact of environmental pollution (Coombes and Viles 2021; Di Turo and Medeghini 2021), public awareness and creativity (Cheng et al. 2018; Ross and Saxena 2019; Wells et al. 2015), city dynamics (Prayitno and Qomarun 2007), and balance of tradition and modernity (D'Alessandro 2016; Nuryanti 1996b) go hand in hand with the concept of environmentally friendly sustainable development (Coombes and Viles 2021; D'Alessandro 2016; Shijin et al. 2020). Structurally, buildings and landscapes in cultural heritage construction experience many vulnerabilities including due to weather conditions, pollution, and the effects of climate change (Fatorić and Egberts 2020; Olefs et al. 2021; Prieto, Verichev, and Carpio 2020; Yang, Dong, and Li 2019).

According to the research analysis findings, it can be concluded that the Laweyan Batik Tourism Kampung area meets the criteria of a region with significant cultural heritage potential. This includes its historical significance, community culture, economic culture, architecture, and the overall area. As a result, it is crucial to ensure the sustainable conservation of this area during its development.

The practice of activities in the Laweyan kampung area consists of living activities, working on batik, and good tourism activities. Activities in settlements as activities in settlements in general, do not show an excessive impact on the environment. However, batik production activities and batik tourism that are held can provide an increasingly piling environmental burden, so it needs to be anticipated before damaging the environment. As stated by Juan Ignacio Pulido-Fernandez et al. that tourism development can cause environmental damage, so tourism has very high environmental costs (Pulido-Fernández, Cárdenas-García, and Espinosa-Pulido 2019). Therefore, the development of the Laweyan kampung area needs to pay attention to the concept of building environmentally friendly to support sustainable development. For this reason, the research formulates a development

strategy in line with the sustainable development goals by adopting the green environment concept, including green community, green open space and infrastructure, green waste, green transportation, green water, green energy, and green building.

4.1. Green community

In the direction of a green community, the active participation of the Laweyan community together with various stakeholders (government, business, and society) in building an environmentally friendly green environment has been seen by the existence of program activities in various fields. In line with Judith Chen-Hsuan Cheng's opinion, i.e. to increase the development of historical areas as green tourism requires public awareness of the importance of environmental sustainability so that the development of tourism activities is oriented towards the creation of a green built environment (Cheng et al. 2018). The role of the community can be increased by tourism education through community groups both formally and informally. The achievement of sustainable development is possible through an environmentally friendly orientation with a green concept (Yousaf et al. 2021).

Analyzing the impact of the "heritagization" of metro stations on travelers and staff is key to evaluating their role, beyond critical assumptions about their beneficial effects on the health and education of users. Based on semi-structured interviews, this study will examine user interpretations of the interactions built by representations of heritage underground and heritage above the ground, as well as their awareness of heritage narratives played in the metro. As we will argue, even if an inherited metro station operates according to a strict top-down procedure, its perception by users varies in different degrees of awareness, acceptance, and contestation, which even calls into question the efficiency of its governance goals (Yuliani and Setyaningsih 2018).

Community involvement in the development of tourist kampung so that conservation efforts and a green environment can be achieved, as the results of previous research conducted by Sri Yuliani et al. about the role of the community in supporting the sustainability of green design in Surakarta City (Martínez 2023; Yuliani, Hardiman, and Setyowati 2020). Green Community by the Laweyan community was formed through the Laweyan Batik Tourism Kampung Development Forum, which consists of the entire Laweyan community. The green community in Laweyan Batik Tourism Kampung is of course the participation of the government, businesses, and society that has been organized and formed in the Kampung Batik Laweyan Tourism Development Forum. The management consists of various elements of the Laweyan

community, both from batik entrepreneurs, youth, entrepreneurs, and other sectors.

Another important element is the role of the government and tourism stakeholders (Garrod and Fyall 2000; Patandianan and Shibusawa 2020) Laweyan kampung area. Stakeholders in tourist destinations must commit to more compliance with environmental regulations that translate into the growth of tourism activities, as well as limiting the risk factors that these activities pose to the environment and its potential for future growth.

4.2. Green setting and infrastructure

The development of Laweyan Batik Tourism Kampung should have an area planning and design concept that aims to improve the quality of urban area spatial plans that are more sensitive and responsive to green elements.

The spatial layout of the community settlements in the Laweyan area, especially those of batik merchants, was influenced by the character of Javanese aristocratic settlements, consisting of a pavilion, kraton (ndalem), sleeping quarters (sentong), vestibule (gandok), pavilion, factory, high fort fence, more than one regol (as a security pass), the front yard of the house quite spacious with the orientation of the building facing north-south. The roof of the building uses a pyramid roof. In its development to emphasize its existence as a specific area, the character of the building in Laweyan is influenced by European and Islamic architectural styles, so that many Indisch (Javanese-European) architectural-style buildings have sprung up with simple inward-oriented, flexible, high-fenced facades, with distinctively Middle East patterned floors.

Laweyan boasts a distinctive environmental arrangement characterized by narrow streets that can accommodate only one car at a time, creating an exclusive atmosphere. These small, tight alleys are a defining feature of the Laweyan area, with houses closely situated and displaying unique architectural designs that give a sense of enclosedness. Although efforts to incorporate green infrastructure are visible, such as the presence of drainage channels, clear sewer pipes, and trees lining one of the roads, their impact on providing shade is limited. The implementation of green settings in Laweyan aims to enhance the quality and quantity of Green Open Space through various strategies. This involves considering the figure-ground relationship, which includes urban building coverage, open spaces, and the road network, pedestrian paths, and other linkages. These elements serve as unifying factors for various activities within the area, as depicted in Figure 2. Functionally, green open spaces offer multiple benefits, such as aesthetics, ecological preservation, protection, hydrological regulation, cleanliness, climate regulation, educational



a.Pavement path as green road b.Open space with natural consideration

Figure 2. Green setting and infrastructure in the Laweyan Batik Tourism Kampung area.

opportunities, soil conditions, and social aspects. These benefits contribute to mitigating environmental issues, including reducing air pollution, minimizing the risk of flooding, controlling noise pollution, and addressing other environmental challenges.

The existence of green open space in the Laweyan area is found in several places, including in the area of riverbanks, street corners, roadsides, and vacant land on the edges of the road. The riverbank area grows naturally; this area is overgrown with many trees and plants, so it can prevent the soil from being eroded by river water. The artificial garden area, at the corner of the road has added to the beauty of the presence of trees and plants as well as increasing the quality of oxygen and soothing the environment giving color to the area. The benefits of a garden will balance out an environment full of houses and other buildings, as well as paved roads. Another potential area is the roadside with shrubs like hedges, while the larger area is planted with large trees. Plants lined up along the roadside, making the kampung area cooler and fresher with healthier air quality.

The communal area is furnished with supplementary components, such as:

(a) Street furniture

Each segment of street furniture must have different priorities for certain attributes in conveying information. Therefore, it is necessary to understand the stakeholders, such as tourism developers and government policymakers, to make informed and informed decisions that will increase the attractiveness of this tourist destination and increase the number of visitors to street furniture (32). To create comfort, the environment requires street furniture components in its environment. The Street Furniture includes: the provision of chairs in the Laweyan area at the corner of this street is considered to support the Green Environment to provide

comfort for pedestrians. These roadside chairs can be decorated with plants around them so they look greener. Near the seats, large trees are provided so that this area is more shady and protected from the sun. The roof of the chair can also be designed as a garden roof or a kind of pergola covered by vines. The use of the above plants is also an effort to support the Green Environment concept.

(b) Street lights

The existence of street lights on every street corner so that there is lighting in the kampung. Because the presence of these streetlights will have a positive impact, overcoming the risk of accidents and crime in the area. With the lights, local people and tourists will feel safe passing through this area at night and can beautify the atmosphere at night.

(c) Road marker

The road marker in the Laweyan area contains a detailed map of the area, as well as a road marker that shows the name of the street and what buildings are in the area. It is written that there are ancient houses and batik factories. With this road marker, tourists will find it easier to find the road and the object they are looking for. Road signs like the one above can be found at every street corner. This is very helpful for domestic tourists who are visiting. However, the language used is only Indonesian so the road markers do not help foreign tourists.

There is also information about the road in the form of a map of Kampung Batik Laweyan. On this map, there are locations where batik shops are located. The road markings in Laweyan Batik Tourism kampung are very good. However, the only language used is Indonesian. Therefore, international tourists may not benefit from the presence of these road markers. Road markers

should be made bilingual as in other tourist objects

(d) Trash cans

The existence of trash bins as the main need for environmental facilities is a mandatory thing that must be owned in a kampung, especially a tourist kampung. On each side of the road, there is a gutter, and on both sides of the road, there are alternately cement bins and plastic trash cans. Therefore, tourists are responsible for disposing of garbage not anywhere

(e) Pergola

Pergola is part of the building or stand-alone, which usually serves as a shade with overgrown vines. There are several existing pergolas with a distance of about 11 meters. This pergola is 2.7 meters high by 1.7 meters wide. This pergola is overgrown with vines. The plants look organized, which indicates the maintenance of the pergola. With this pergola, pedestrians can take shelter from the heat while walking. Another benefit of this pergola is that it adds open green space, which does not take up land. This pergola is one of the big efforts to create a Green Environment in Laweyan kampung. Therefore, this pergola needs to be treated more seriously so that the plants can grow well and are pleasing to the eye.

4.3. Green waste

In the plan for the relocation and re-functionalization of city-specific elements, the Laweyan Batik Tourism Kampung area is functioned as a batik home industry area and is directed to organize and control the industrial wastewater system (Surakarta 2019). Through the concept of green waste, efforts to reduce and treat waste and waste, by applying the concept of zero waste and the 3 R approach: Reduce (limiting consumption), Reuse (utilizing items repeatedly), and Recycle (processing materials for reuse). Furthermore, environmentally friendly waste management and disposal technologies contribute to supporting green waste management.

Green waste in the Laweyan area is an effort to reduce and treat waste and waste. One of the initial steps to empower Laweyan Kampung is to build a Wastewater Treatment Plant (IPAL), as shown in Figure 3. Thanks to assistance from the German government, the IPAL was built in Laweyan Batik Tourism Kampung which functions to treat industrial wastewater so that it is suitable for flow back into the river without pollutants, not dangerous, and environmentally friendly. For waste treatment in the batik industry in the Laweyan area, it is quite good, because there is already a wastewater treatment plant that can reduce the pollution that occurs. This sewage treatment



Figure 3. Wastewater treatment plant (IPAL) in the Laweyan Batik Tourism Kampung.

system begins by collecting waste from industrial houses in 11 wells located along the river. After being accommodated, the batik waste is processed and filtered in a well that already contains oxygen. After the process, the wastewater is channeled into the river through small pipes. Waste that has been treated has less chemical content than wastewater that has not been treated at all. In addition, the color of batik waste that is processed first is clearer and closer to the color of water even though it still has dye.

4.4. Green transportation

Green transportation in the Laweyan area is sustainable transportation, to encourage people to use environmentally friendly public transportation, to reduce the use of private vehicles. The creation of road infrastructure that supports the development of mass transportation will be able to reduce vehicle emissions, as well as create a friendly road space for pedestrians and cyclists.

The main road network in the Laweyan Batik Tourism Kampung area has a regular grid pattern. The existing types of roads consist of highways, neighborhood roads, and alleys between houses/alleys. The environmental road conditions in the Kampung Laweyan area are generally good, paved with a width of 3–6 meters, and there are small roads/narrow alleys 1–2 meters wide from the paving blocks. The road is a road whose right and left are limited by a high wall fence (3–6 meters), which is a characteristic of the Laweyan Kampung area.

Laweyan Batik Tourism Kampung is a beautiful area free from vehicle pollution because Laweyan is a traditional kampung in the city of Surakarta. Communities who are members of this community inherit something unique in terms of means of transportation, i.e. becak. Pedicab is one of the traditional means of transportation that has implemented green transportation, three-wheeled walking using human power, without the help of engines and fuel. The use of tricycles and bicycles is a solution for environmental conservation. Public awareness in the Laweyan Batik



Tourism Kampung area shows the tendency of people who prefer to walk to carry out daily mobility in the kampung area. Green transportation in the Laweyan area is also supported by the interest of visitors/tourists who prefer to go around on foot, using bicycles or tricycles while seeing the batik handicrafts displayed in the kampung area.

4.5. Green water

Green water in the Laweyan area is an efficient use of water resources that aims to save water use, through efforts to improve water quality by applying the concept of Eco drainage and zero runoff. The concept of Eco drainage is used to avoid local flooding in the kampung area, i.e. by making drainage flows by draining excess water into rivers. Through this concept, the excess water in the rainy season can be managed as much as possible to seep into the soil naturally, to increase the water content of the soil. So that in the dry season, water can still be expected to be stored in the ground. The zero runoff concept is placed around the Laweyan area road, where there are several reservoirs to store rainwater which will then be absorbed, and the rest is channeled into the river slowly. In addition, an infiltration well at the front of the house accommodates and absorbs rainwater that falls from the roof of the house. In addition, efforts to cover the ground surface with paving so that water can seep into the ground.

4.6. Green energy

Green Energy in the Laweyan area is a green city strategy that focuses on reducing energy use through saving use and increasing the use of renewable energy as well as on the use of efficient and environmentally friendly energy sources. However, the utilization of the Laweyan Batik Tourism Kampung area still uses electrical energy as the main energy in the use of buildings and daily activities. Laweyan Batik Tourism Kampung uses a source of electrical energy at the State Electricity Company. Even though it is still on the scale of a home industry, the electricity demand used by each company is quite large. Not to mention the added need for electricity for households that use a lot of additional electronic goods for air conditioning and lighting systems in the house such as the use of air conditioning and lights that turn on during the day, this is caused by environmental conditions where the distance from one house to another is close to each other and fenced high walls to block access to sunlight and wind flow into the house. Therefore, it is necessary to innovate in the use of alternative energy through the utilization of the potential of the tropical climate in the city of Surakarta.

4.7. Green building

Green building in Laweyan Batik Tourism Kampung is an environmentally friendly structures and buildings designed to reduce negative impacts, the construction is efficient, both in design, construction, and maintenance, by implementing green buildings that are energy efficient, economical, efficient, durable, and comfortable. The buildings in the surrounding area still use the concept of buildings in general, i.e. buildings made of bricks. Green Building supports sustainable and competitive development, providing valuable ideas and advice on how the natural, environmental, and cultural assets of the landscape should be properly explored (22) so that environmentally friendly building designs can be implemented to realize harmony with the environment.

The research conducted by Untung et al. concluded that changes in housing in the Laweyan kampung area should pay attention to comfort and protection as well as provide benefits for developing economic activities (33). Therefore, the development of housing for businesses needs to be carried out by considering the potential and environmental preservation. Green building does not only focus on ecological problems but also pay attention to the problem of beauty and harmony between the structure of the building and the natural environment around it and does not forget to improve the environment, even though the appearance of this building is not different from other buildings by designing a ventilation system and taking into account good air circulation. For example, by making the ceiling of the room high enough, and making openings in the house in the form of windows, lattices, pendant lights, and the selection of environmentally friendly materials for the house.

An effective green building in the Laweyan area can be achieved by limiting the maximum building height to four floors, and the maximum settlement in Laweyan consisting of two floors. Buildings with less than four floors do not require an elevator which can reduce the use of electrical energy. In several places in the Laweyan area, buildings that implement green building buildings include the Mahkota Laweyan Batik House, it is found that there are elements of green building with the application of a pergola that uses vegetation elements as its constituents, and Langgar Merdeka. The Langgar Merdeka building has many openings such as windows and doors where the frame material is made of natural materials, i.e. wood. One of the building requirements in the green building criteria is to pay attention to air quality and room comfort. The air quality in the Langgar Merdeka building has smooth air circulation because it applies many openings so the air quality in the building is also good.

Complementing other studies, the adaptive reuse approach changes the existing building typology

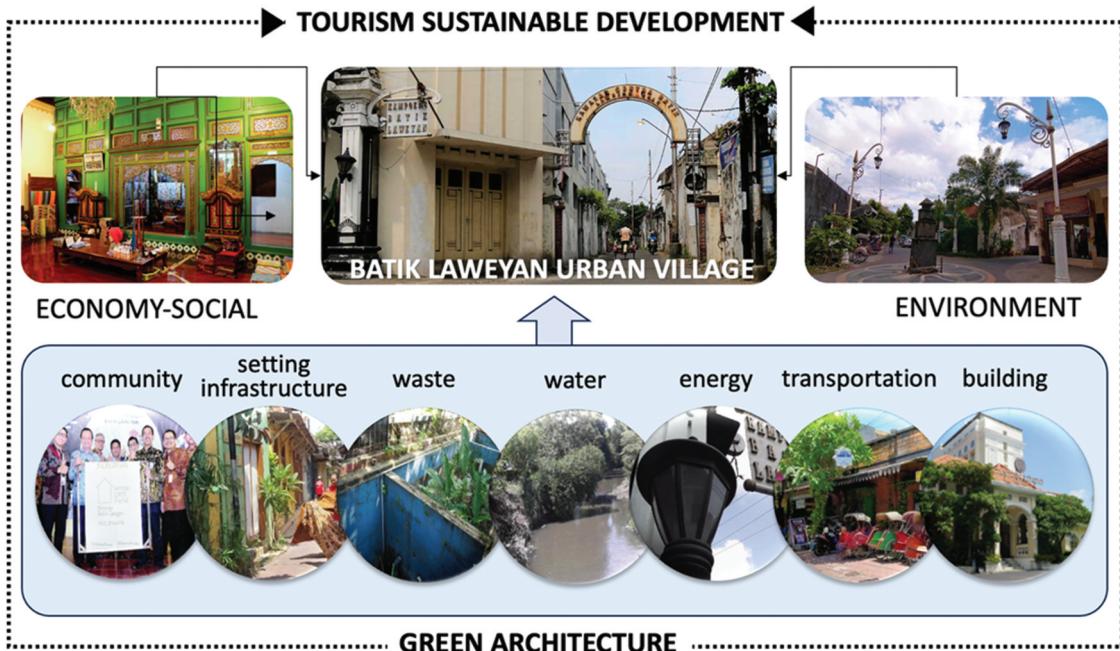


Figure 4. Green architecture toward sustainable development in the Laweyan Batik Tourism Kampung.

which requires adjustments to technical improvements in almost all aspects, causing changes in the visual character of the exterior, interior and close quarters with different levels of significance. The results of the research show that changes that comply with the conservation principle increase the value of the function parameter, while those that do not conform eliminate the uniqueness of the visual character (Devitasari, Suprapti, and Harsitanto 2021). In line with this, this research shows that the support of the concept of green architecture can be implemented in the Laweyan village case study with integrated components in realizing the development of a sustainable tourist village, as shown in Figure 4.

Thus, the research formulates that the strategy for developing the Laweyan Batik Tourism Kampung area with consideration of sustainable conservation is a concrete step as the implementation of tourism area management is based on the principles of sustainable development as set out in Agenda 21. This principle includes the sustainable and responsible management of natural resources (guaranteeing the interests of the community, present and future generations), as well as environmental insight (achieving harmony, harmony, and balance between humans and the environment).

This research finds that achieving sustainable development requires considering the integration of economic and social aspects that lead to environmentally friendly community activities. Among several strategies for implementing green architecture in Laweyan, it turns out that the community aspect plays a dominant role in the success. The community element necessitates continuous guidance and education to foster awareness for environmentally conscious

building practices. This can be taken into consideration, indicating that in tourist villages where economic activities have environmental impacts, control can be exerted by supporting the community's role through continuous environmental education.

5. Conclusion

The implementation of the green environment concept through sustainable conservation offers several benefits and is associated with a more ecologically responsible problem-solving approach, as it is safer, more harmonious, and visually appealing. When it comes to small-scale environmental management, it enables greater community participation, cost-effectiveness, and the development of low-impact tourism settlements. A specialized approach is required for residential development in tourist areas to ensure that changes in spatial patterns, buildings, and the environment prioritize the preservation of natural local characteristics in a sustainable manner.

To effectively apply the green architecture concept and optimize historical areas such as Tourism Kampung, particularly in Laweyan Batik Tourism Areas, a three-stage process can be followed. The first stage involves identifying the dominant features that contribute to the tourism potential of the kampung, encompassing both physical and non-physical aspects (such as architectural artifacts, social dynamics, economic factors, and cultural elements). The second stage focuses on empowering the non-physical potentials, aiming to enhance the active involvement of the local community by leveraging their indigenous knowledge and wisdom. Finally, the third stage entails



establishing a green environment-based area through sustainable conservation practices, effectively managing natural resources, and adopting a physical development strategy that aligns with the environmental needs and sustainability goals of the local area.

The implementation of green architecture concepts in the development of Laweyan tourist village can set a precedent for successfully educating the community of tourism participants who engage in handicraft livelihoods that could harm the environment. This can transform them into an environmentally conscious community that continues to preserve local culture.

Acknowledgements

The authors would like to give gratitude to Program Studi Arsitektur Universitas Sebelas Maret for supporting this research and LPPM (Lembaga Penelitian dan Pengabdian Masyarakat) Hibah Non APBN in 2023 with contract number 228/UN27.22/PT.01.03/2023. We also give our thanks to the informants from the Laweyan community.

Disclosure statement

No potential conflict of interest was reported by the author(s).

Funding

This work was supported by the Universitas Sebelas Maret [228/UN27.22/PT.01.03/2023].

Notes on contributors

Sri Yuliani is an associate professor in the Department of Architecture, Engineering Faculty, Universitas Sebelas Maret. Her research interests are in green architecture and sustainable environmental design.

Wiwik Setyaningsih is an associate professor in the Sustainable Architecture Research Group in Faculty of Engineering, Universitas Sebelas Maret. Her research interests are tourism development and architecture universal design.

ORCID

Sri Yuliani <http://orcid.org/0000-0002-4288-2959>

Author contributions

Conceptualization, S.Y. and W.S.; methodology, S.Y.; validation, W.S., and S.Y.; formal analysis, S.Y.; resources, W.S.; data curation, W.S.; writing original draft preparation, W.S.; writing, review and editing, S.Y.; visualization, W.S., and S.Y.; supervision, W.S.; project administration, S.Y.; funding acquisition, S.Y.

References

- Cheng, J. C. H., A. H. Chiang, Y. Yuan, and M. Y. Huang. 2018. "Exploring Antecedents of Green Tourism Behaviors: A Case Study in Suburban Areas of Taipei, Taiwan." *Sustainability (Switzerland)* 10 (6): 1928. <https://doi.org/10.3390/su10061928>.
- Coombes, M. A., and H. A. Viles. 2021. "Integrating Nature-Based Solutions and the Conservation of Urban Built Heritage: Challenges, Opportunities, and Prospects." *Urban Forestry & Urban Greening* 63 (April): 127192. InternetAvailable from. <https://doi.org/10.1016/j.ufug.2021.127192>.
- D'Alessandro, F. 2016. "Green Building for a Green Tourism. A New Model of Eco-Friendly Agritourism." *Agriculture and Agricultural Science Procedia* 8:201–210. <https://doi.org/10.1016/j.aaspro.2016.02.094>.
- Devitasari, A., A. Suprapti, and B. I. R. Harsitanto. "Adaptive Reuse Approach Towards Visual Character Change in Conservation Buildings." *ARTEKS : Jurnal Teknik Arsitektur* 6 (3): 459–470. 2021 Dec 31. <https://doi.org/10.30822/arteks.v6i3.1141>.
- Di Turo, F., and L. Medeghini. 2021. "How Green Possibilities Can Help in a Future Sustainable Conservation of Cultural Heritage in Europe." *Sustainability (Switzerland)* 13 (7): 3609. <https://doi.org/10.3390/su13073609>.
- Fatorić, S., and L. Egberts. 2020. "Realising the Potential of Cultural Heritage to Achieve Climate Change Actions in the Netherlands." *Journal of Environmental Management* 274 (March): 111107. <https://doi.org/10.1016/j.jenvman.2020.111107>.
- Garrod, B., and A. Fyall. 2000. "Managing Heritage Tourism. Managing Heritage and Cultural Tourism Resources: Critical Essays." *Annals of Tourism Research* 27 (3): 682–708. [https://doi.org/10.1016/S0160-7383\(99\)00094-8](https://doi.org/10.1016/S0160-7383(99)00094-8).
- Haigh, M. 2020. "Cultural Tourism Policy in Developing Regions: The Case of Sarawak, Malaysia." *Tourism Management* 81 (May): 104166. Available from. <https://doi.org/10.1016/j.tourman.2020.104166>.
- Hariyani, S., Antariksa, A., and Pratomo, A. S. 2006. "Preservation of the Batik Laweyan Kampung Area in the City of Surakarta." *DIMENSI (Jurnal Teknik Arsitektur)(Jurnal Teknik Arsitektur)* 34 (2): 93–105. <https://doi.org/10.9744/dimensi.34.2>.
- Kepariwisataan, U.-U. 2010. "Undang-Undang Kepariwisataan." *Regulasi*.
- Martínez, P. G. 2023 Jan 1. "'Minding the gap': The Heritagization of Metro Stations and Its Perception by Users in the Shanghai Metro." *Tunnelling and Underground Space Technology* 131:104772. <https://doi.org/10.1016/j.tust.2022.104772>.
- Nur'aini, R. D. 2017. "ANALISIS KONSEP GREEN ROOF PADA KAMPUS SCHOOL OF ART, DESIGN AND MEDIA NTU SINGAPORE DAN PERPUSTAKAAN UI DEPOK." *Nalars* 16 (2): 161–168. <https://doi.org/10.24853/nalars.16.2.161-168>.
- Nuryanti, W. Heritage and Postmodern Tourism. 1996a; Available from: <https://www.sciencedirect.com/science/article/abs/pii/0160738395000623?via%3Dihub>.
- Nuryanti, W. 1996b. "Heritage and postmodern tourism." *Annals of Tourism Research* 23 (2): 249–260. [https://doi.org/10.1016/0160-7383\(95\)00062-3](https://doi.org/10.1016/0160-7383(95)00062-3).
- Olefs, M., H. Formayer, A. Gobiet, T. Marke, W. Schöner, and M. Revesz. 2021. "Past and Future Changes of the Austrian Climate – Importance for Tourism." *Journal of Outdoor*

- Recreation and Tourism* 34 (August 2020): 100395. <https://doi.org/10.1016/j.jort.2021.100395>.
- Pan, S. Y., M. Gao, H. Kim, K. J. Shah, S. L. Pei, and P. C. Chiang. 2018. "Advances and Challenges in Sustainable Tourism Toward a Green Economy." *Science of the Total Environment* 635:452–469. InternetAvailable from. <https://doi.org/10.1016/j.scitotenv.2018.04.134>.
- Patandianan, M. V., and H. Shibusawa. 2020. "Importance and Performance of Streetscapes at a Tourism Destination in Indonesia: The residents' Perspectives." *Frontiers of Architectural Research* 9 (3): 641–655. <https://doi.org/10.1016/j.foar.2020.05.006>. InternetAvailable from.
- Prayitno, B., and Q. Qomarun. 2007. "Morfologi Kota Solo (Tahun 1500-2000) DIMENSI (Jurnal Teknik Arsitektur)." *DIMENSI (Journal of Architecture and Built Environment)* 35 (1): 80–87. <https://doi.org/10.9744/dimensi.35.1.80-87>.
- Prieto, A. J., K. Verichev, and M. Carpio. 2020. "Heritage, resilience and climate change: A fuzzy logic application in timber-framed masonry buildings in Valparaíso, Chile." *Building & Environment* 174 (December 2019): 106657. <https://doi.org/10.1016/j.buildenv.2020.106657>.
- Pulido-Fernández, J. I., P. J. Cárdenas-García, and J. A. Espinosa-Pulido. 2019. "Does Environmental Sustainability Contribute to Tourism Growth? An Analysis at the Country Level." *Journal of Cleaner Production* 213:309–319. <https://doi.org/10.1016/j.jclepro.2018.12.151>.
- Putra, B. D., R. Horne, and J. Hurley. 2019. "Place, Space and Identity Through Greening in Kampung Kota." *Journal of Regional & City Planning* 30 (3): 211–223. <https://doi.org/10.5614/jpwk.2019.30.3.3>.
- Ross, D., and G. Saxena. 2019. "Participative Co-Creation of Archaeological Heritage: Case Insights on Creative Tourism in Alentejo, Portugal." *Annals of Tourism Research* 79 (October): 102790. InternetAvailable from. <https://doi.org/10.1016/j.annals.2019.102790>.
- Roychansyah, M., and A. Diwangkari. 2009. "Kampung Oriented Development Model : A Rapid Appraisal of Local Communities." *Informal Settlements & Affordable Housing* 2 (11): 119–134.
- Shijin, W., M. Yaqiong, Z. Xueyan, and X. Jia. 2020. "Polar tourism and environment change: opportunity, impact and adaptation." *Polar Science* 25 (October 2019): 100544. InternetAvailable from. <https://doi.org/10.1016/j.polar.2020.100544>.
- Surakarta, W. 2012. "Peraturan Daerah Kota Surakarta Nomor 1 Tahun 2012 Tentang Rencana tata Ruang Wilayah Kota Surakarta Tahun 2011-2031". (4): 110.
- Surakarta, W. 2019. *Rencana Pembangunan Jangka Panjang Daerah Kota Surakarta Tahun 2005 - 2025*, Pemerintah Daerah Kota Surakarta, 314. Surakarta: Pemerintah Kota Surakarta Propinsi Jawa Tengah.
- Trišić, I., S. Štetić, D. Privitera, M. D. Petrović, M. Maksin, S. Vujović, Z. Jovanović, et al. 2021. "Perspectives on Sustainable Tourism Development in the Hotel Industry —A Case Study from Southern Europe." *Sustainability* 13 (10): 5563. <https://doi.org/10.3390/su13105563>.
- UNESCO. Asia-Pacific Regional Periodic Reporting (II). World Heritage. 2012;June).
- Wells, V. K., D. Manika, D. Gregory-Smith, B. Taheri, and C. McCowlen. 2015. "Heritage tourism, CSR and the role of employee environmental behaviour." *Tourism Management*. InternetAvailable from48:399–413. <https://doi.org/10.1016/j.tourman.2014.12.015>.
- Yang, X., L. Dong, and C. Li. 2019. "Microclimate Tourism and Microclimate Tourism Security and Safety in China." *Tourism Management* 74 (269): 110–133. InternetAvailable from. <https://doi.org/10.1016/j.tourman.2018.12.012>.
- Yousaf, Z., M. Radulescu, C. I. Sinisi, L. Serbanescu, and L. M. Paunescu. 2021. "Harmonization of Green Motives and Green Business Strategies Towards Sustainable Development of Hospitality and Tourism Industry: Green Environmental Policies." *Sustainability* 13 (12): 6592. <https://doi.org/10.3390/su13126592>.
- Yuliani, S., G. Hardiman, and E. Setyowati. 2020. "Green-Roof: The Role of Community in the Substitution of Green-Space Toward Sustainable Development." *Sustainability (Switzerland)* 12 (4): 1429. <https://doi.org/10.3390/su12041429>.
- Yuliani, S., and W. Setyaningsih. 2018. "THE IMPACT OF THERMAL PERFORMANCE ON THE ROOF SURFACE TO ENERGY EFFICIENT OF HIGH-RISE BUILDING IN THE TROPICAL REGION." *Arsitektura* 16 (1): 129–138. <https://doi.org/10.20961/arst.v16i1.20748>.