JTOS Journal of Tourism Sustainability
Available online at: https://jtos.polban.ac.id/index.php/jtospolban
Journal of Tourism Sustainability
Volume 5 No 3, 2025 (Special Issues): 28-44
DOI: 10.35313/jtospolban.v5i3.172

Planning for Facility Development at the Situ Cileunca Tourist Area, Bandung Regency

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Abstract

Situ Cileunca, a natural lake-based tourist destination in Bandung Regency, suffers from substandard tourism infrastructure and spatial disorganization. Preliminary observations reveal critical issues, including limited lodging access, degraded circulation in culinary areas, and the deterioration or absence of key facilities such as toilets, piers, observation towers, and gazebos. This study aims to develop a comprehensive facility development plan for the ±19,600 m² tourism area, aligned with spatial planning regulations and sustainable asset management principles. A mixed-methods approach was adopted, combining field observation, stakeholder interviews, and document analysis. The facility development framework is structured into three core dimensions: (1) accommodation facilities (lodging, culinary zones, playground); (2) supporting facilities (entrance gate, parking, footpaths, sanitation, security posts, waste bins, souvenir kiosks, piers, gazebos, observation towers, and photo spots); and (3) tourism auxiliary facilities (information center and signage systems). The proposed development emphasizes spatial restructuring, visual quality enhancement, and functional integration to improve visitor experience and operational efficiency. The total post-tax estimated cost for the entire project is IDR 52,239,849,498. The results contribute to formulating a replicable model for facility redevelopment in nature-based tourism destinations.

Keywords: Tourism Infrastructure, Facility Redevelopment, Spatial Planning, Sustainable Tourism, Cost Estimation

INTRODUCTION

Tourism has evolved into a strategic sector with considerable potential to generate long-term economic, environmental, and socio-cultural benefits for developed and developing countries (Du Cros & McKercher, 2020). As the global tourism market becomes increasingly competitive, the ability of destinations to offer high-quality infrastructure, authentic experiences, and efficient services has emerged as a critical determinant of success (Purwono et al., 2024). Consequently, tourism is widely adopted as a key driver of regional development, contributing to employment, local entrepreneurship, and public revenue (Ndjurumbaha et al., 2024).

In Indonesia, Bandung Regency has experienced a significant surge in tourist arrivals over the past five years. According to the Department of Culture and Tourism of Bandung Regency, visitors increased from 2,072,697 in 2020 to 7,716,767 by the end of 2024. This rapid growth reflects a broader trend toward nature-based tourism, where travellers seek immersive experiences that emphasize environmental beauty, physical activity, and cultural authenticity (Iqbal, 2022; Kiriman et al., 2023).

One notable destination contributing to this trend is Situ Cileunca, a natural lake-based tourism site in the southern Bandung Regency region. Situated at an altitude of 1,418 meters above sea level and covering approximately 1,400 hectares, the site offers various outdoor attractions—notably white-water rafting—that distinguish it from other lake tourism areas in West Java. Its rural landscape, surrounded by agricultural fields and local settlements, further enhances its appeal as a community-based ecotourism hub. The tourism zone occupies a land area of approximately 19,600 m², owned by PT PLN Indonesia

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Power and managed collaboratively with the Department of Culture and Tourism. Regional planning regulations (Bandung Regency Regulation No. 27/2016) designate the area as a natural tourism development zone, with additional protection as a floodplain buffer at least 50 meters from the lakeshore.

Despite its natural assets and growing demand, preliminary assessments indicate that Situ Cileunca suffers from deteriorating infrastructure and inadequate facilities, compromising the tourist experience. Identified deficiencies include substandard accommodations, insufficient culinary areas, limited accessibility, poorly maintained toilets, damaged piers, and missing support elements such as observation towers, gazebos, and signage. Environmental changes—particularly rising lake water levels—have rendered many lakeside facilities unusable, increasing safety risks and limiting operational capacity. These challenges are believed to have contributed to a sharp decline in ticket sales, dropping from 65,352 in 2023 to 43,177 in 2024. The results of an initial evaluation underscore the urgency for redevelopment. Table 1 presents the performance scores of three key facility dimensions: accommodation, supporting infrastructure, and auxiliary tourism facilities. All dimensions are categorized as "poor," with a combined average score of only 31.5%.

Table 1. Evaluation of Tourism Facility Quality at Situ Cileunca

Facility Dimension	Score (%)
Accommodation Facilities	38.00
Supporting Facilities	27.98
Auxiliary Tourism Facilities	28.50
Average Score	**31.5**

Source: Research data, 2025

These findings confirm a clear gap between tourist expectations and existing facility conditions, compounded by shifting trends in tourism that increasingly emphasize aesthetic value, interactivity, environmental sustainability, and inclusive design. This study proposes an integrated development plan to redevelop tourism facilities within the Situ Cileunca tourism area. The objective is to optimize the spatial use of the 19,600 m² site by applying a multidimensional framework encompassing: 1) accommodation facilities (lodging, culinary zones, and playgrounds); 2) supporting facilities (entrance gate, footpaths, parking areas, toilets, prayer room, souvenir kiosks, piers, gazebos, observation towers, and designated photo spots); and 3) auxiliary tourism facilities (information centers and signage systems). Drawing upon a synthesis of best practices from previous studies (Insani et al., 2022; Maksum et al., 2024; Mohamad et al., 2022), this paper aims to produce a spatially coherent, environmentally adaptive, and visitor-oriented facility development blueprint to enhance the long-term attractiveness and functionality of Situ Cileunca.

LITERATURE REVIEW

Asset Management

Assets are fundamental components that hold economic, operational, or exchange value and are owned by individuals, organizations, or institutions (Siregar, 2004). In tourism, assets are managed to maintain sustainability, efficiency, and alignment with long-term development goals. (Campbell et al., 2024) Classify assets into five main categories: 1) real estate and facilities; 2) plant and production; 3) mobile assets; 4) infrastructure; and 5) information technology. These categories are outlined in Table 1.

Table 1. Classification of Asset Types

Asset Type	Examples
Real Estate & Facilities	Land, offices, warehouses, schools, hospitals
Plant & Production	Mining, semiconductors, textiles, petroleum, electronics, food
Mobile Assets	Aircraft, railways, shipping, public transport
Infrastructure	Roads, electricity grids, telecom systems, water distribution
Information Technology	Computers, networks, software, digital platforms

Source: Campbell et al., 2024

In tourism, attractions such as natural parks, heritage sites, and lake-based destinations are categorized as tangible assets, particularly within the real estate and facilities group. These assets require structured management through a defined asset life cycle, which includes planning, acquisition, operation, maintenance, and disposal. As shown in Figure 1, the planning phase serves as a critical stage to define needs, forecast asset utility, and design sustainable interventions (Campbell et al., 2024). The facility development planning in Situ Cileunca represents the initial phase of asset management, where infrastructure needs are identified, and design interventions are proposed to ensure long-term value creation and functionality.

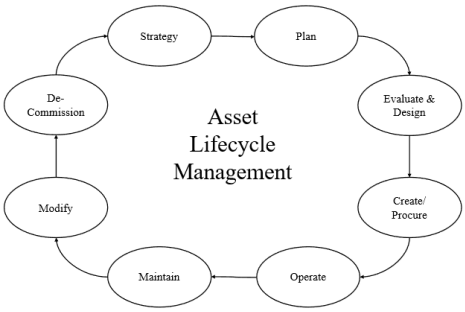

Figure 1. Asset Life Cycle Management
Source: Campbell et al., 2024

Tourism Assets

Tourism assets refer to all physical and service-oriented elements that facilitate tourism activities. These include attractions, infrastructure, amenities, and services that form the tourism ecosystem (Sugiama, 2013). According to Government Regulation No. 50 of 2011, tourist attractions are categorized as: Natural Attractions: Areas shaped by environmental characteristics, such as lakes, mountains, and forests. Lakes possess strong development potential due to their scenic appeal and ecological value (Walangitan et al., 2024). Activities such as landscape appreciation, boating, and outdoor recreation are often supported by facilities like piers, shelters, and information signage (Kartini et al., 2024). Cultural Attractions: Derived from cultural heritage, local traditions, arts, and human creativity. Artificial Attractions: Man-made developments, including recreational parks, museums, and entertainment complexes. Situ Cileunca, as a natural lake-based destination, is categorized as a natural attraction with tangible tourism assets that need structured development to meet growing demand and improve visitor experiences.

Tourism Facilities

While natural beauty is a primary attraction, tourists also require well-functioning facilities to ensure safety, accessibility, and comfort (Utomo et al., 2024; Budisetyorini et al., 2021). Facilities are the physical infrastructure—buildings, amenities, and utilities—that support tourism operations (Wibowo et al., 2023). These facilities are typically grouped into three functional categories (Insani et al., 2022): 1) Accommodation Facilities: Lodging facilities that provide temporary stay and rest, often complemented by culinary and entertainment services; 2) Supporting Facilities: Elements that enhance operational and visitor comfort, including parking areas, toilets, prayer rooms, security posts, waste bins, souvenir kiosks, and footpaths; and 3) Auxiliary (Complementary) Facilities: Infrastructure that enriches the tourist experience, such as information centers, observation towers, directional signage, and photo spots. In the context of Situ Cileunca, these facility dimensions are central to the redevelopment plan. Their integration is essential to meet visitor expectations while aligning with spatial, ecological, and operational considerations.

Redevelopment

Redevelopment refers to reconstructing or upgrading existing infrastructure on previously developed land to revitalize economic, physical, and social functions (Akinbamijo & Aladetuyi, 2019). This approach is particularly relevant for tourism areas facing infrastructural decline or misalignment with current trends. Situ Cileunca is designated under Bandung Regency's Regional Regulation No. 4 of 2019 as a nature-based tourism development zone, emphasizing agritourism and special interest tourism. Agritourism, such as educational plant cultivation tours, merges agriculture and tourism to generate new visitor engagement and community-based income. To ensure sustainable redevelopment, three key principles must be applied (Ginting et al., 2020): 1) Ecological Sustainability: Protecting the environment, conserving biodiversity, and maintaining ecosystem services; 2) Socio-Cultural Sustainability: Respecting local values, ensuring community participation, and protecting heritage; and 3) Economic Sustainability: Promoting long-term viability through efficient resource use and consistent income generation. These sustainability pillars guide the redevelopment design's physical planning, material selection, and facility zoning.

Zoning and Spatial Planning

Zoning is a spatial planning tool used to regulate land use based on ecological sensitivity, accessibility, and intensity of tourism activities. One of the most applicable zoning models in tourism is the Tripartite Zoning

Model (Cooper, 2005), which divides areas into: 1) Core Zone: The main attraction area with strict conservation principles. Only low-impact infrastructure is permitted (e.g., eco-trails, viewing shelters). Construction is limited to 10–20% of the zone; 2) Buffer Zone: A transitional area that minimizes tourism pressure on the core zone. Development intensity may reach 60–80%, including gazebos, information boards, and eco-friendly sanitation; and 3) Service Zone: The area for high-intensity use, including entry points, parking, food stalls, camping sites, and other visitor facilities. Development here supports economic activity while maintaining environmental control. This model provides the spatial structure for the proposed facility layout at Situ Cileunca, ensuring functional efficiency while preserving the site's ecological and socio-cultural integrity.

Based on the theoretical foundation described above, this study integrates asset management principles, sustainable tourism development, and spatial zoning to formulate a facility redevelopment plan for Situ Cileunca. These concepts inform the categorization of facility types, spatial design strategies, and the planning framework that guides this research.

METHODS

This study employed a descriptive research design using a mixed-methods approach, integrating quantitative and qualitative data. Descriptive research aims to systematically present observed phenomena and highlight the characteristics of a defined population or setting (Hardani et al., 2020). Integrating quantitative and qualitative approaches allows for a more comprehensive analysis combining numerical accuracy and contextual depth. The quantitative approach utilized in this study focuses on collecting and analysing measurable numerical data (Sugiyono & Lestari, 2021). This includes data related to spatial measurements, facility counts and dimensions, and cost estimation calculations. Meanwhile, the qualitative approach aims to develop an in-depth understanding of situational context through non-numeric data such as narratives, observations, and visual documentation (Moleong, 2007). Qualitative insights were especially relevant in evaluating facility conditions, site character, and regulatory alignment.

Types of Data

This research relied on quantitative and qualitative data types: 1) Quantitative data refer to numerically expressed information, typically analyzed through parametric methods. This study includes the number, size, and distribution of tourism facilities, land area calculations, and estimated development costs; and 2) Qualitative data refer to non-numerical information analyzed through non-parametric scales (e.g., nominal and ordinal). Examples include site condition assessments, functional analysis of tourism zones, and comparative facility benchmarking.

Data Sources

The data were collected from primary and secondary sources: 1) Primary data were obtained directly through field observations and structured stakeholder interviews. These data include visual assessments of existing tourism facilities at Situ Cileunca, stakeholder perspectives, and conditions of comparative destinations; and 2) Secondary data were gathered from regulatory documents, scholarly literature, and online sources, including Bandung Regency tourism development plans, national tourism policies, and academic studies relevant to tourism infrastructure and spatial planning. These materials provided contextual benchmarks and development standards for facilities.

Data Collection and Analysis

The research adopted descriptive analysis techniques involving quantitative and qualitative procedures: 1) Quantitative analysis was used for spatial calculations, facility dimension mapping, and cost estimations. Basic statistical techniques were applied to analyze measurable data and visualize spatial planning outcomes; and 2) Qualitative analysis involved systematic categorization and interpretation of non-numeric data, aimed at describing the contextual and environmental conditions of the tourism site. This included synthesizing visual observations, stakeholder input, and interpretive analysis of planning needs. Combining these analytical approaches, the study seeks to develop a comprehensive facility development plan that reflects technical accuracy and site-specific contextual awareness.

RESULTS AND DISCUSSION

Spatial Planning Calculation

Spatial planning calculations ensure all development activities conform to the applicable Regional Spatial Plans (RTRW) and relevant environmental regulations. These calculations form the foundation for sustainable

land use planning, aligning tourism development with ecological preservation and public safety. According to Bandung City Regional Regulation No. 5 of 2022, areas designated for tourism development are subject to the following spatial parameters: 1) Maximum Building Coverage Ratio (BCR): 60%; 2) Minimum Green Open Space (GOS): 25%; 3) Maximum Floor Area Ratio (FAR): 2.4.

In addition, Bandung Regency Regulation No. 27 of 2016 mandates spatial constraints for waterfront and roadway zones: 1) A minimum lakeside setback of 50 meters from the highest water level; and 2) A minimum roadside setback of 10 meters from the edge of the road pavement. These spatial guidelines maintain environmental balance and minimize flooding, erosion, and overdevelopment risks. The spatial planning calculation for the Situ Cileunca tourism site is summarized in Table 3.

Table 3. Spatial Planning Calculation for Situ Cileunca Tourism Area

Description	Calculation	Total (m^2)
Lakeside Setback Area	50 m × effective boundary	9,989.3
Roadside Setback Area	10 m × boundary adjacent to the road	1,268.2
Total Planning Area	Registered site area	19,600.75
Maximum Building Coverage	60% × 19,600.75	11,760.5
Minimum Green Open Space	25% × 19,600.75	4,900.2
Allowable Building Base	19,600.75 – (GOS + setbacks)	3,443.0
Maximum Floor Area (FAR)	2.4 × 19,600.75	47,041.8
Max. Theoretical Building Floors	47,041.8 ÷ 3,443.0	13.7

Source: Research data, 2025

The spatial calculation demonstrates that the allowable building base area is approximately 3,443 m^2, while the maximum floor area is 47,041.8 m^2, equivalent to a maximum theoretical height of 13.7 floors. However, due to the tourism character of the site and environmental sensitivities, high-rise structures are not desirable and will not be implemented. Instead, spatial planning focuses on low-rise, eco-friendly structures to preserve visual aesthetics and ecological integrity. Furthermore, the lake setback zone covering 9,989.3 m^2 falls under special regulation. As per Ministry of Public Works and Public Housing Regulation No. 28/PRT/M/2015, certain low-impact structures may be permitted within this zone. In addition, the Ministry of Environment and Forestry Regulation No. P.13/2020 allows conditional development near water bodies, provided that:1) The foundation system is adapted to site soil characteristics; 2) The building footprint is minimized to reduce ground pressure; 3) Structures above water must apply environmentally appropriate design and materials. The proposed master plan complies with these guidelines. The total projected footprint of planned facilities (including permanent buildings and paved paths) is 2,200.38 m^2, which remains well within the 3,443 m^2 limit. Thus, the facility development plan for Situ Cileunca is spatially compliant and environmentally adaptive, aligning with zoning regulations and promoting responsible tourism development.

Zoning Classification of the Situ Cileunca Tourist Area

To ensure spatial coherence, environmental preservation, and effective visitor management, the Situ Cileunca tourism area is organized into three functional zones: core zone, buffer zone, and service zone, as illustrated in Figure 2. This zoning strategy follows the Tripartite Zoning Model commonly applied in nature-based tourism planning (Cooper, 2005), balancing accessibility with ecological sensitivity.

1. Core Zone: The core zone represents the primary attraction and conservation area. It is limited to 10% of the total planning area, equivalent to approximately 1,954.87 m^2. Land use in this zone is strictly regulated to preserve the natural environment and minimize anthropogenic disturbance. Planned facilities are limited to low-impact, non-permanent structures, such as footpaths, piers, observation towers, waste bins, and information boards. These structures enhance the visitor experience while maintaining the site's ecological integrity.
2. Buffer Zone: The buffer zone, covering 60% of the total area or 11,175.06 m^2, acts as a transitional area between the core and service zones. Its purpose is to mitigate the environmental impact of tourism activities on the most sensitive areas. Facilities in this zone include: Toilets, Gazebos, Footpaths, Photo spots, Waste bins, and Informational signage. This zone supports moderate activity levels and environmental education, facilitating circulation and visitor dispersion while preserving scenic and ecological value.
3. Service Zone: The service zone, constituting 30% of the land area or 5,640.39 m^2, is the central hub for visitor interaction, services, and local economic activities. Facilities in this zone include: Main entrance gate, Parking area, Culinary zone, Souvenir kiosks, Playground, Lodging, Mushola (prayer room), Security post, Information center, Internal footpaths, Waste bins, Information boards. Development in this area

emphasizes functionality, accessibility, and support services, while maintaining design harmony with the surrounding natural context.

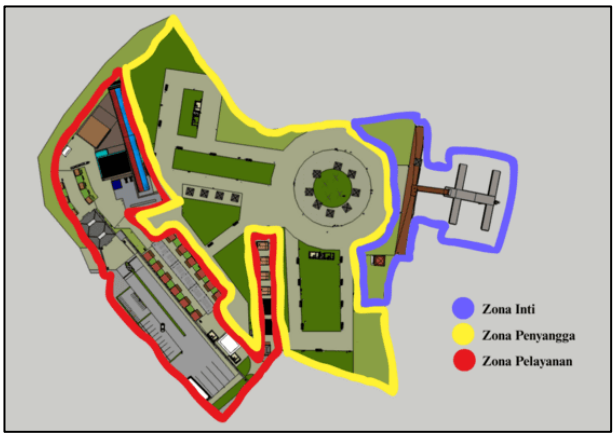

Figure 2. Zoning Classification of the Situ Cileunca Tourist Area

Source: Research data, 2025

In addition to the main zoning areas, additional land allocations include: 1) 606.76 m² constructed above the waterbody using floating or paved structures to accommodate the pier. This area is not included in the core zoning calculation but remains essential for water-based tourism; 2) 1,231.33 m² designated as a roadside setback, in compliance with spatial planning regulations; 3) 205.11 m² reserved as local community access routes, ensuring integration between the tourism site and surrounding residential areas. These spatial considerations demonstrate the project's commitment to regulatory compliance and inclusive, sustainable tourism development.

Table 4. Recapitulation of Area Allocation by Zoning Category

Zone	Facility	Area (m²)	Zone Area (m²)	Zone Share (%)
Core	Footpaths	1,214.62		
	Pier	720.00	1,954.87	10%
	Observation Tower	20.25		
Buffer	Footpaths	9,919.73		
	Gazebos	1,183.17		
	Toilets	62.56	11,175.06	60%
	Photo Spot	9.60		
Service	Footpaths	1,802.78		
	Playground	1,200.33		
	Parking Area	1,610.10		
	Main Entrance Gate	235.53		
	Lodging	183.25		
	Culinary Area	248.00		
	Mushola	148.40		
	Souvenir Kiosk	54.00		
	Information Center	150.00		
	Security Post	8.00	5,640.39	30%
Total	—	—	18,770.32	100%

Note: The zoning percentages do not include an additional 606.76 m² of floating/paved facilities (above water) and 1,231.33 m² of road setback.

Source: Research data, 2025

The proposed zoning configuration adheres to the principles of sustainable tourism development, ensuring: 1) Ecological protection in the core zone; 2) Controlled access and educational functions in the buffer zone; and 3) Economic activity and service concentration in the service zone. The proportional distribution of land use (10% core, 60% buffer, 30% service) reflects a deliberate strategy to balance conservation with tourism functionality.

Planning of Accommodation Dimension

The accommodation dimension in tourism facility development encompasses essential services that directly influence visitor satisfaction, duration of stay, and overall destination appeal. At Situ Cileunca, three

key facilities are planned under this dimension: lodging, culinary area, and playground. These facilities are designed to align with spatial zoning, promote sustainability, and accommodate diverse visitor needs.

Lodging

The lodging facilities are strategically located within the service zone to streamline operational management and minimize ecological disruption. The layout adheres to principles of low-impact tourism by concentrating built structures in a designated zone and reducing land fragmentation. Two accommodation types are provided: 1) Type A cottages: Four single-story units, each measuring 24 m^2; 2) Type B cottages: Two double-story units, each floor measuring 36 m^2. This design approach reflects a market segmentation strategy, catering to small families and larger groups. Orientation toward the lake enhances the visual and emotional experience, strengthening the connection between visitors and the natural environment. Each unit is equipped with: 1) Basic amenities: bed, wardrobe, multifunctional room (dining/living), bathroom, and prayer direction indicator (qibla); 2) Sanitation facilities: private toilet and 10-liter trash bin; 3) Safety and operations support: signage, fire extinguisher (APAR), first aid kit, booking counter, and storage room. The overall lodging concept emphasizes compactness, functionality, and environmental sensitivity, ensuring efficient use of space while maintaining comfort and safety standards.

Culinary Area

The culinary area is integrated into the service zone using a clustering layout to enhance spatial efficiency, facilitate access, and create a unified visual identity. This approach is consistent with tourism destination design principles that prioritize cohesive service experiences. Twelve food stalls are planned, matching the number of existing active vendors to ensure social inclusion and continuity of local micro-enterprises. Each stall: 1) Measures 3 × 3 meters; 2) Utilizes container-based modular units made of steel, supporting durability, flexibility, and recycled construction practices; 3) Includes three power outlets, ventilation openings, and clear signage for identification and wayfinding. The central dining area comprises 18 table-and-chair sets, some constructed from repurposed materials, reinforcing sustainable building practices. A polycarbonate canopy serves as roofing, providing shade while maintaining natural light, and contributing to energy efficiency. Key environmental features include: 1) Bioswale drainage system: A vegetation-based runoff channel that promotes water infiltration and reduces load on conventional drainage systems; 2) Two hand-washing stations: Installed to uphold sanitation standards and support visitor hygiene, reinforcing a user-centered approach; and 3) Visual and spatial enhancements, such as the removal of plastic tarpaulins and orderly stall arrangement, support the area's aesthetic and functional quality.

Playground

The playground is located within the service zone and classified as a commercial recreation facility. Existing rides will be dismantled and relocated to the new site, with reusable components integrated into the updated facility design. This reflects the reuse principle in sustainable tourism infrastructure planning. Key features include: 1) Recreational attractions: Mini playground, bumper cars, children's go-karts, and the rainbow slide; 2) Support facilities: Ticket booth, shaded resting area with seating, first aid kit, and fire extinguisher; 3) Safety standards: Safety elements are placed near entry points and adhere to minimum safety regulations for public play areas. Informational tools such as ride signage, pricing boards, and visitor regulations are constructed from weather-resistant materials (e.g., aluminum and PVC). These elements serve to enhance navigation, safety awareness, and behavior control.

A clear code of conduct is enforced, prohibiting:1) Smoking within the play area; 2) Gambling; 3) Use or possession of illegal drugs or alcohol; 4) Carrying sharp weapons or firearms. The playground design prioritizes safety, accessibility, and family engagement, supporting the destination's positioning as a nature-based, family-friendly tourism site.

Planning of Supporting Facility Dimension

Within the dimension of supporting facilities, the development plan includes twelve types of infrastructure. These include the main entrance gate, parking area, security post, footpaths, toilets, prayer room (mushola), waste bins, souvenir kiosks, pier, gazebos, observation tower, and photo spots. Each facility is designed to enhance visitor comfort, safety, and accessibility while reinforcing the functionality and visual quality of the tourism area. A detailed explanation of each component is presented in the following sections.

Main Entrance Gate

The construction of the main entrance gate is designed as a strategic architectural element that functions as a physical point of entry and exit and a representative symbol of the tourism area. Spatially, it is positioned linearly along the primary circulation path of visitors, thereby directing the flow of movement and establishing a strong first impression of the destination's identity. The structural dimensions (11 × 0.8 × 6 m) have been adjusted to maintain visual proportion and ensure visibility from various vantage points throughout the area. The choice of color considers visual prominence and harmony with surrounding natural elements, supporting visual continuity and fostering cohesion between built structures and the natural landscape. With letter heights of approximately 40 cm, the gate's typographic design adheres to the principles of environmental graphic design, emphasizing readability and visual communication in open spaces. Overall, the main entrance gate serves as a physical threshold and a symbolic gateway to the visitor experience, visually representing the site's character. As such, its design plays a significant role in shaping visitors' initial perceptions and reinforcing the overall image of the destination.

Parking Area

The parking facilities in this area are planned to be divided into three zones, namely parking areas for motorcycles, Class I vehicles (private cars), and buses. All parking zones will use grass block paving as a sustainable surface design approach, supporting water infiltration and minimising surface runoff. The vehicular circulation system within the parking area will adopt a one-way traffic flow concept, with separate entrances and exits. Each traffic lane will be designed with a width of 5 meters to allow for efficient vehicle movement and reduce the potential for traffic conflicts within the parking zone. Due to the limited available land for parking, the site will be optimized using designated parking layout types, such as:

1. A perpendicular two-sided parking pattern is implemented for the motorcycle parking area, with standardised parking space dimensions of 0.75 × 2 meters per unit. The circulation lane is designed with a width of 3.5 meters, while the entrance and exit points for the motorcycle parking area are configured at 3 meters wide. The parking area has protective low curbs measuring 10 cm in height as safety barriers. The total planned area for motorcycle parking spans 15 × 7.5 meters, providing accommodation capacity for up to 32 motorcycle units.
2. A single-sided perpendicular parking pattern is adopted for the vehicle parking area, with designated parking space dimensions of 2.3 × 5 meters for automobiles and 3.4 × 12.5 meters for buses. The parking area incorporates protective low curbs with a height of 10 cm as boundary demarcation. Specifically for the automobile parking section, car wheel stops are installed 90 cm from the protective curb edge. The parking area capacity is designed to accommodate 10 automobile units and five bus units, respectively.

The ticketing portal within this tourism area is designed with dual functionality, serving as the primary access point to the tourist area and as the entrance to the parking facilities. This portal system will be equipped with automated mechanisms to enhance operational efficiency. To support optimal vehicular traffic flow, the portal will be constructed with two separate circulation lanes: one designated for incoming vehicles and another for outgoing traffic. To support the service system, a guardhouse will be constructed as a ticket booth and a security post for personnel. The integration of a 2-meter-wide, 103-meter-long pedestrian walkway demonstrates the incorporation of safe pedestrian accessibility within the parking area. Implementing vegetation such as Japanese bamboo and applying natural drainage systems (bioswales) reflects a commitment to ecological integration within the parking infrastructure. To ensure visibility and nighttime security, the area has four lighting units that utilise 6500K lamps installed according to optimal height-to-distance ratios between poles. Safety elements are reinforced through portable fire extinguishers (APAR) and comprehensive signage systems, including location information, entrance and exit directions, and access restrictions. These elements demonstrate a holistic design approach that considers functional, safety, sustainability, and user comfort aspects within an integrated system.

Footpaths

The pedestrian pathway planning for the Situ Cileunca tourism area is designed with universal accessibility principles, environmental sustainability, and landscape visual quality in mind. Locally-sourced grass block material is selected to enhance water absorption capacity, prevent slippery surfaces, and reflect an environmentally-friendly approach in developing the area's basic infrastructure. The walkway width varies with a minimum dimension of 2.85 meters, which is based on spatial requirement calculations for three primary user types: pedestrians without luggage requiring approximately 0.6 meters of movement space, pedestrians carrying items requiring 0.75 meters of space, and pedestrians with special needs requiring approximately 1.5

meters of movement space. This calculation is the foundation for inclusive and safe pedestrian pathway planning for all users. Spatially, the walkway is designed to connect various main facilities within the area, employing elongated and curved patterns to create movement aesthetics and strengthen the destination's visual character. The pathway design functions as a circulation facility and as part of an enjoyable and adaptive tourism experience that responds to the site's topographical contours.

Complementary facilities are designed to enhance user comfort and overall open space value. Seating is provided every 10 meters along the pathway with an estimated requirement of approximately 70 units, while 4-meter-high garden lights are installed at similar intervals to ensure uniform nighttime illumination. Vegetation elements and natural drainage systems (bioswales) with a minimum width of 1 meter are integrated along the pathway. Combining grass, shrubs, shade trees, and climbing plants creates shading effects, improves microclimate quality, and adds aesthetic value.

Security Post

This facility involves demolishing the existing security post structure, then reconstructing it using brick materials, with functional expansion to three units: reception area, changing room, and toilet facilities. The total area of the security post to be constructed is 8 m^2. The dimensional specifications for each space are: toilet (1 × 1.6 m), reception area (2 × 2.4 m), and changing room (1 × 1.6 m). The addition of front windows serves as visual monitoring points for the surrounding area, strengthening the spatial control function of the area. Additionally, the provision of three electrical outlets supports operational activities.

The security post is equipped with emergency equipment, including one oxygen set, a first aid kit, a stretcher, and a powder-type fire extinguisher (APAR) as preventive measures for emergencies. Additional facilities, such as emergency sirens with a range of up to 200 meters, demonstrate an effective early warning system to respond to potential threats or incidents within the tourism area. Providing supporting equipment, including handcuffs, umbrellas, water dispensers, wall clocks, and office furniture (desks and chairs), constitutes part of fulfilling the standard requirements for security posts that are adaptive to personnel needs.

Toilet

The provision of toilet facilities addresses visitors' basic sanitation needs while integrating inclusive design principles and environmental sustainability within the tourism area's spatial planning. Two primary toilet construction locations are focused on the buffer zone, strategically positioned adjacent to the playground and gazebo as high-intensity gathering areas. The toilets have units for men, women, and people with disabilities, demonstrating a commitment to universal accessibility principles. Each male and female toilet building consists of two cubicles measuring 1 × 1.6 m, equipped with sitting toilets, waste bins, and standard amenities such as clothing hooks. The circulation area within the building is furnished with two washbasins, mirrors, soap dispensers, and automatic hand dryers. For the male toilet, two additional urinals are provided to enhance efficiency.

Meanwhile, the disability toilet has dimensions and equipment supporting user mobility, including vertical and horizontal grab bars and an easily accessible door entry. The building structure utilizes brick and ceramic materials as a selection of durable and easily maintainable materials. Natural air ventilation is provided through roster elements on the walls to maintain circulation and prevent excessive humidity. Symbol-based signage will be installed on the exterior of the building to differentiate male, female, and accessible toilets, accompanied by no-smoking restrictions to maintain environmental comfort.

Mushola (Prayer Room)

The mosque's construction is designed as an integral component of public facilities supporting visitors' spiritual needs, with an inclusive, adaptive, and functional design approach. The mushola is located in the buffer zone with a main building area of 9 × 9 meters, plus an additional 1-meter-wide terrace on three sides (front, right, left), resulting in a total site area of 11 × 10 meters. This design accommodates accessibility for persons with disabilities through ease of circulation and supporting elements such as seating and shoe racks in the terrace area. Mushola access is differentiated by gender, where the right door is designated for male worshippers and the left door for females, reflecting sensitivity to worship protocols and user privacy. Building materials consist of a combination of brick and glass, supporting air circulation and natural lighting. Three electrical outlets are available in the male, female, and Imam areas to support flexibility in worship and teaching activities.

Supporting facilities include separate toilets for men and women, each with two cubicles, equipped with ablution areas featuring three faucets with hanging partitions, floor drains, and washbasins along the

circulation path. The dimensions of ablution and sanitation facilities are designed to ensure smooth activities and cleanliness of the worship area. Within the mosque, two prayer equipment storage racks are provided, along with prayer carpets covering 90 m², and basic equipment such as prayer veils, sarongs, and Quran copies. The use of anti-slip carpets at the entrance considers visitor safety aspects. Overall, the mushola design fulfils religious functions and reflects the integration of comfort, accessibility, and sanctity values within the tourism area's spatial planning.

Waste Bin

The waste bin in the tourism area is designed to support environmental impact reduction, adhering to sustainable and educational waste management principles. Waste bins are classified into two main categories: organic waste (green color) and inorganic or recyclable waste (yellow color). All units utilize weather-resistant fiber base materials with covers and identification labels to facilitate source separation. Waste bin placement adheres to the provisions of Indonesian Ministry of Health Decision No. 1429 of 2006, which requires the provision of waste bin units every 20 meters along pedestrian pathways. The physical design of waste bins is adjusted to visitor needs and intensity, featuring box-shaped 100-liter capacity units for high-activity areas and 40-liter cylindrical units for general pathways. The distribution details include: 1) A total of 37 waste bins with 40-liter capacity installed along general pedestrian pathways spanning ±748 meters, specifically in areas other than culinary and accommodation zones; and 2) An additional six waste bins with 100-liter capacity allocated for the area in front of the information center and walkways in the culinary and accommodation zones (with pathway lengths of 46.4 m and 39.52 m respectively).

Souvenir Kiosks

The souvenir kiosk is designed to support local economic activities while enhancing tourist experiences through facilitated access to regional specialty products. The kiosks are positioned in a strategic service zone, adjacent to the playground area and information center, to ensure high visibility and optimal visitor circulation. Six kiosk units are designed with an area of 9 m² each and arranged in clusters within two opposing rows, separated by a 6-meter-wide pedestrian pathway with 3.5-meter inter-kiosk spacing. This layout adopts open circulation principles, facilitating visitor movement and creating a more interactive and comfortable spatial atmosphere.

The ventilation system in the kiosk relies on door and window openings at the front and additional air vents (louvers) at the rear, representing an integration of passive tropical architectural elements to maintain thermal comfort within the spaces. Each kiosk has at least three electrical outlets to support electrical requirements. Basic interior fixtures consisting of two standard shelving units (90 × 30 × 150 cm) are provided as initial facilities, while additional interior elements are delegated to tenants for customization according to the type and characteristics of products sold. Each kiosk unit will have a 30 × 100 cm nameplate, designed flexibly to accommodate tenant identity. Safety aspects are addressed by providing one Dry Chemical Powder fire extinguisher (APAR) unit in the nearest area and natural drainage systems (bioswales) that manage rainwater runoff in an environmentally friendly manner.

Pier

The pier construction comprises a boardwalk, waiting area, and boat boarding facilities. The boardwalk uses an open-structure pier design with a concrete framework directly connected to the mainland area. The broadwalk surface utilizes composite wood, exhibiting high weather and humidity resistance while maintaining natural aesthetics. The broadwalk pathway measures 5 × 60 meters and is approximately 0.5 meters above the water surface. A waiting zone consisting of one 2 × 2-meter protective gazebo unit is positioned near the boat boarding activity area to support visitor comfort. The boat boarding facility is designed with a floating pier system comprising four units measuring 5 × 12 meters per unit, complemented by a 5-meter-wide, 30-meter-long pedestrian access. Adding a 3 × 10-meter access stairway with handrails enhances accessibility and user safety, particularly for vulnerable groups such as older people and children. The floating pier's technical specifications include:

1. 12-meter pier length to accommodate boats with a maximum size of 10 meters.
2. 5-meter apron width to ensure smooth boarding and alighting activities.
3. 4-meter spacing between fenders.
4. Provision of 4 bollard units with installation intervals of every 3 meters as boat mooring equipment.

To enhance safety and accessibility in the pier area, the installation of 1-meter-high protective barriers extending along the pier sides is planned to prevent risks of falling into the water. As a complement to safety

facilities, life buoys will also be positioned periodically every 50 meters along the pier, resulting in a total requirement of 3 units. Additionally, 14 garden lights with a height of 1 meter will be provided.

Gazebo

The construction of gazebo facilities is designed to provide comfortable, shaded, and strategic rest areas for visitors while supporting passive recreational functions in the Situ Cileunca tourism area. Twelve gazebo units will be constructed in the buffer zone at two main locations: around the pier and playground, representing areas with high activity intensity and substantial seating requirements. Each gazebo unit is designed with 2 × 2-meter dimensions, utilizing a stage-type structure supported by shallow foundations measuring 35 × 35 cm at each support point. This stage structure design adapts to land contours and natural drainage conditions and aims to minimize direct disturbance to soil surfaces and vegetation. Building materials utilize weather-resistant wood for walls and flooring, as well as protective roofing that reduces direct exposure to rain and solar radiation. To support comfort and modern functionality, each gazebo has at least three electrical outlets to meet user power requirements, such as device charging. Additionally, each unit is integrated with surrounding natural drainage systems (bioswales) for rainwater management, simultaneously supporting green infrastructure principles and area environmental resilience.

Observation Tower

The construction of an observation tower is planned for the core zone of the tourism area, serving as an architectural element that supports educational recreational activities and appreciation of Situ Cileunca's natural landscape. The building structure is designed with a 9-meter height and three observation floors. The ground floor area reaches 20.25 m^2 with dimensions of 4.5 × 4.5 meters, considered to remain proportional to the site and avoid creating excessive visual burden on the surrounding landscape.

The main building structure utilizes reinforced concrete to ensure structural robustness and resistance to vertical and lateral loads. Inter-floor access employs wooden stairs, providing natural aesthetic value and reducing overall structural load. As observational support facilities, the tower will be equipped with telescope facilities on the highest floor to strengthen educational and recreational functions, particularly in lake-based nature tourism. To ensure visitor safety, all sides of the tower area will be equipped with permanent protective barriers that are robust and corrosion-resistant, in accordance with safety standards for multi-level public facilities.

Photo Spot

The reconfiguration of photo spot elements in the Situ Cileunca tourism area is conducted as part of a visual harmonization strategy and adaptation to the latest spatial planning framework of the region. Several existing photo spots, including the Chinese-themed spot and plastic flower installations, are scheduled for demolition because their design is considered excessively conspicuous and incompatible with the prioritised natural landscape character. This decision also considers new development locations in zones requiring functional adjustments and the need to develop more contextual and environmentally sustainable photo spot designs. As part of this initiative, the photo spot bearing the inscription "Situ Cileunca" will undergo development to become an iconic and representative visual identity element. The new design utilizes translucent acrylic material capable of illumination with golden-yellow colored lighting, thereby enhancing aesthetic appeal, particularly during nighttime hours. Each letter has dimensions of 1 meter in height and 0.8 meters in width, positioned on a permanent foundation measuring 1 × 9.6 × 0.5 meters, which will be constructed within the buffer zone of the area.

Development Planning for Tourism Auxiliary Facility Dimensions

Two facilities are planned within the additional tourism facility dimension: an information center and information boards. Further explanations regarding these facilities are presented in the following descriptions.

Information Center

The information center will be positioned within the service zone. The accessibility of this building is designed inclusively by providing ramp access at the entrance area with a 5-degree gradient, enabling access for visitors with special needs. From a construction perspective, the building utilizes common and durable materials, including brick walls, ceramic flooring, and a roof structure comprising lightweight steel framework with tile roofing. The information center at the Situ Cileunca tourism area also functions as the main entrance that connects visitors to the tourism area. The building has dimensions of 15 × 10 meters. This structure not

only serves informational needs but also encompasses various functional spaces that support operational requirements and visitor comfort, including:

1. Lobby area (4 × 15 m) and reception desk (2.5 × 6 m) designed as entry access for tourists to enter the tourism area. The lobby has double doors and a "Welcome" sign measuring 47.5 × 15 cm. This lobby area also serves as the main pathway that every tourist must traverse before accessing the Situ Cileunca tourism area, equipped with swing gates across three lanes, where one lane is designated for wheelchair users with a width of 120 cm and two lanes with a width of 90 cm. The reception area (180 × 60 × 110 cm) provides a complete service desk with two chairs and one computer to provide information and initial services.
2. Display room or multipurpose room (2.5 × 5 m) equipped with a map bulletin board (120 × 180 cm) and a 19-inch electronic information screen, functioning as promotional media and visual and interactive dissemination of tourism destination information.
3. Storage room (2.4 × 4 m) utilized for storing operational equipment and logistics.
4. Staff-specific restrooms separated by gender, each restroom containing two stalls measuring 1 × 1.6 m per stall and equipped with circulation areas measuring 1.7 × 2 m and 1.5 × 3.3 m for washbasin areas and urinal areas specifically for male restrooms.
5. Management office room (3.5 × 8.8 m) equipped with a desk (240 × 120 × 75 cm) for six people, six chairs, one computer, one printer, and a surveillance system consisting of two CCTV units.

The information center is equipped with specialized information boards that function as markers for the presence of the Tourism Information Center (TIC). The design of these boards is differentiated from general traffic signs, with a brown background and white text and other information. This information board is a Gateway Sign placed at the TIC entrance, measuring 0.5 × 0.5 m. This marker is mounted on a support pole 3 meters above ground level, silver in color, and utilizes galvanized material.

Information Boards

As part of efforts to enhance safety, comfort, and ease of visitor navigation in the Situ Cileunca tourism area, the installation of information boards and additional directional signs is planned, in addition to those already available at parking facilities and playground areas. These information boards include directional signs and prohibition signs, with detailed explanations as follows:

1. Directional signs to be installed include:
   a. Assembly point signs, with a planned quantity of 2 units. These signs will be placed in two open areas, specifically at points located near the gazebo area. They feature a white base color, with blue edge lines, black symbols, and black letters/numbers.
   b. Evacuation route direction signs are placed according to requirements (Provincial Regulation of DKI No. 179 of 2016), and for this tourism area, the distance between signs is established at every circulation point and turn. The plan is to have 20 units, featuring a green base color and white edge lines, symbols, and letters/numbers.
2. Prohibition signs to be installed include:
   a. No swimming signs, totaling two units, were placed at the dock near the life buoy.
   b. No littering signs, totaling seven units, were placed at several strategic locations, including the playground, culinary area, souvenir kiosks, pier, and 3 points in the gazebo area. This placement considers that these locations are public areas anticipated to experience high levels of tourist visitation.
   c. Design specifications for prohibition signs utilize a white base color, with red edge lines, black symbols and letters/numbers, and red text. All three types of prohibition signs will use leaf-shaped symbols measuring 45 × 45 cm.

Site Plan for Situ Cileunca Tourism Facility Development Planning

Following the identification process of the development plan for 17 facility indicators in the Situ Cileunca tourism area, which have been classified into three main dimensions, the subsequent step involves compiling and presenting a visualization in the form of a site plan. This visualization aims to provide a comprehensive overview of the spatial distribution of all planned facilities, thereby facilitating understanding of the interconnections between facilities within the area. The site plan design illustrating the spatial distribution results of these facilities can be observed in Figure 3.

Figure 1. Site Plan Design of Situ Cileunca Tourism Object
Source: Research data, 2025

Cost Estimation

Cost estimation determines the projected budget required to implement the planned project. The methods utilized in this estimation process are the comparative unit method (per square meter) and the installed unit method. The total cost estimation represents the comprehensive calculation of all financing components required for project implementation, encompassing demolition activities, construction, and procurement of goods. The demolition cost estimation represents the expenses required for dismantling existing facilities. The construction cost estimation constitutes the total budget requirements necessary for project implementation, including the procurement of goods and services as the primary components in construction activity execution. This procurement of goods also encompasses non-structural requirements such as furniture, interior elements, information media, and other complementary items supporting facility operationalization.

Including a value-added tax (VAT) of 12% in the cost estimation compilation constitutes part of fiscal obligation fulfillment in accordance with applicable taxation regulations in Indonesia. This tax component is necessary to ensure that the compiled budget estimation reflects real and accurate funding requirements and aligns with statutory regulation provisions in the project financing system. The total cost estimation for tourism object development planning after tax (12% VAT) amounts to IDR 52,239,849,498. The estimation can be observed in Table 5.

Table 1 Cost Estimation for Situ Cileunca Tourism Facility Development

No	Estimation Type	Facility	Cost Estimation (IDR)
1	Demolition	Accommodation	14,000,000
		Culinary Area, Souvenir Kiosk, and 3 Toilet Points	35,900,000
		Playground	90,100,000
		Main Gate	200,000
		Toilet	1,200,000
		Mushola	10,805,000
		Pier	1,000,000
		Gazebo	7,000,000
		Photo Spot	3,725,000
		Information Center and Security Post	11,000,000
		Total Demolition Cost	**174,930,000**
2	Construction	Accomodation	525,625,000

No	Estimation Type	Facility	Cost Estimation (IDR)
		Culinary Area	213,900,000
		Playground	720,927,000
		Main Gate	17,600,000
		Parkirng Area	215,751,900
		Footpath	2,385,976,300
		Security Post	18,000,000
		Toilet	125,120,000
		Mushola	404,800,000
		Pier	40,850,000,000
		Gazebo	219,167,550
		Observation Tower	121,500,000
		Photo Spot	6,566,400
		Information Center	320,000,000
		Total Construction Cost	**46,144,934,150**
3	Procurement of Goods	Accomodation	21,237,800
		Culinary Area	13,835,400
		Playground	2,835,000
		Parking Area	124,819,800
		Footpath	32,880,000
		Security Post	1,570,881
		Toilet	8,276,818
		Mushola	6,583,314
		Waste Bins	21,921,000
		Souvenir Kiosks	3,062,500
		Pier	2,337,276
		Observation Tower	288,700
		Photo Spot	9,000,000
		Information Center	64,070,127
		Information Boards	10,140,000
		Total Procurement Cost	**322,858,616**
Total Cost Estimation Before Tax			**46,642,722,766**
VAT 12%			**5,597,126,732**
Total Cost Estimation After Tax			**52,239,849,498**

Source: Research data, 2025

Discussion

The comprehensive development of the Situ Cileunca tourism destination represents a strategic initiative that extends beyond physical improvements, integrating fundamental aspects related to service quality enhancement and the holistic optimization of destination appeal. This redevelopment strategy is designed to generate synergistic effects that transform visitor experiences by providing high-quality facilities, responsive service systems, and diversifying innovative tourist attractions. Implementing this revitalization strategy is projected to yield significant positive impacts on visitor satisfaction levels, which are expected to activate organic marketing mechanisms such as revisit intention and word-of-mouth recommendations. This phenomenon fosters a positive cycle in which visitors with satisfying experiences are more likely to return and actively promote the destination within their social networks (Fatmawati & Olga, 2023), thereby contributing to a multiplier effect in tourist arrival growth. From this perspective, the quality of tourism facilities becomes a critical component requiring prioritized attention within the framework of sustainable tourism development. Investments in facility standard improvements serve as a prerequisite for achieving high levels of visitor satisfaction and as a strategic foundation for building a strong destination reputation, enhancing competitiveness within the tourism industry, and ensuring the long-term economic sustainability of the Situ Cileunca tourism destination..

CONCLUSION

The impact of this development directly has the potential to enhance tourism service quality and attract more tourists, which in turn can provide economic contributions to local communities, such as increased business opportunities, employment, and income enhancement. Based on the analysis and discussion results,

it can be concluded that the Situ Cileunca tourism facility development planning project produces several main points as follows:

1. Facility construction is conducted with reference to standards established in relevant regulations. The development planning is categorized into three dimensions, including:
   a. The accommodation dimension encompasses the reconstruction of lodging, culinary areas, and playgrounds. Accommodation facilities are designed with improved spatial quality, basic amenities, and supporting elements such as signage and safety equipment. The culinary area is centrally reorganized within the service zone, equipped with kiosks, tables, chairs, pedestrian pathways, and washbasins. The playground is reconstructed with the addition of ticket booths, seating areas, information boards, and safety equipment to support recreational activities. This is expected to directly impact increasing tourist visits and the length of stay.
   b. Supporting facilities are enhanced by improving the main entrance gate, parking areas, and pedestrian pathways, and adding new amenities. The security post is reconstructed and equipped with emergency tools and auxiliary equipment. Public restrooms are redesigned to be inclusive and fitted with modern sanitation systems. The prayer facility (mushola) is upgraded to include separate worship areas, ablution, and toilet facilities. Waste bins are strategically placed and integrated with a waste separation system. In addition, souvenir kiosks, docks, gazebos, observation towers, and designated photo spots are developed. This spatial arrangement indirectly contributes to more efficient area management, reinforces the image of an orderly and inclusive tourist destination, and creates a safer and more accessible public space for all community groups.
   c. Tourism auxiliary facilities include constructing information centres and providing information boards. Information centers are integrated service spaces encompassing guest reception areas, multipurpose rooms, management offices, and sanitation facilities. Information boards are provided in the form of evacuation and prohibition signs to support the safety and orderliness aspects of the tourism area. These facilities contribute to creating a more complete and educational tourism experience.
2. Cost estimation in the 2025 Situ Cileunca tourism facility development planning is classified into three categories: demolition costs amounting to IDR 174,930,000, construction costs amounting to IDR 46,144,934,150, and procurement costs amounting to IDR 322,858,616. Therefore, the estimated budget required amounts to IDR 52,239,849,498, including Value Added Tax (VAT) of 12%.

ACKNOWLEDGMENTS

The authors thank Bandung State Polytechnic for academic support and the Department of Culture and Tourism of Bandung Regency for data contributions in this research.

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