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(RESEARCH ARTICLE)

INCORPORATING FUNCTIONAL AND AESTHETIC CONSIDERATIONS INTO THE DESIGN OF THE G-WALK PARKING AREA GARDEN WITHIN AN ECO-FRIENDLY RESIDENTIAL COMPLEX

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ABSTRACT

This study aims to evaluate the landscape arrangement of the parking area at G-Walk CitraLand Musi II Park, Palembang, focusing on parking space requirements and aesthetic aspects that influence user comfort and satisfaction. The research was conducted from November 2024 to January 2025 using a descriptive qualitative method involving field observations and interviews with site managers. The research stages included inventory, survey and interview, data processing, visual landscape assessment using the Scenic Beauty Estimation (SBE) method, concept synthesis, consultation with experts and managers, and final design. Design tools used were SketchUp 2024, Enscape, Canva Design, Garden Planner, and CapCut. The design applied the Ecological Architecture concept and was presented in 2D, 3D, and animated video formats. The Ecological Architecture concept prioritizes green open space so that hardscape and softscape design elements emphasize both aesthetics and the functional performance of the parking area while respecting the surrounding environment. The total estimated budget required for implementation is approximately Rp 872,201,980.

Keywords: Design; Parking accumulation; Parking volume; Parking space requirements; Scenic Beauty Estimation; Ecological architecture

1 INTRODUCTION

G-Walk Park CitraLand Musi II Palembang is a tourist attraction established in 2021 with an area of 10 hectares. It features the largest Ferris wheel in the area and adopts a modern and environmentally friendly concept, while also serving as a platform for micro, small, and medium enterprises (MSMEs). Visitor vehicles require adequate parking facilities. Parking is a transportation infrastructure that must be properly managed to meet the need for appropriate and sufficient space. Parking functions as a temporary stopping place for vehicles, either for short or long periods, according to driver needs [1].

Commonly used parking angles are 30°, 45°, 60°, and 90°. According to the Guidelines for the Planning and Operation of Parking Facilities issued by the Directorate General of Land Transportation (1998), parking is defined as a temporary immobilized state of a vehicle. Government Regulation Number 43 of 1993 concerning road infrastructure and traffic

defines parking as vehicles that stop in designated places, whether marked by signs or not, and not solely for the purpose of picking up or dropping off passengers or goods.

Parking standards have been established in various regulations. These standards regulate the dimensions of parking spaces, vehicle layout, and access for users with disabilities. Regulation of the Minister of Public Works No. 29 of 2006 states that the standard parking space size for private cars is 2.5 m × 5 m, while larger vehicles require more space. The standard size for motorcycles is 0.75 m × 2.00 m [7].

Good landscape design, through the arrangement of elements such as the selection of greenery, plays an important role in improving aesthetics, comfort, and environmental function [2]. Planting flowering shrubs such as paper flower (Bougainvillea), asoka (Saraca asoca), and jasmine (Jasminum sambac) can add color and aesthetic elements to parking areas [3]. Groundcover plants are also important to reduce soil erosion, especially in parking areas that are frequently exposed to human traffic, helping to keep soil temperatures stable [4].

The addition of pedestrian paths and adequate lighting can provide added value to commercial or recreational areas. Aesthetically pleasing landscaping also contributes to the creation of more environmentally friendly spaces that align with the principles of sustainable development [5]. From a functional perspective, landscaping must also consider aesthetics. Lynch [6] explained that aesthetics in parking lot arrangement involve not only the selection of vegetation or decorative elements but also elements that support user comfort and beautify the space. The use of vegetation, good lighting, and aesthetic pavement increases the visual value of a parking lot while helping integrate the natural environment with urban facilities [2].

This study evaluates the existing landscape arrangement of the G-Walk CitraLand Musi II parking area in terms of parking space requirements and aesthetic quality, and proposes a redesigned layout based on the Ecological Architecture concept to improve both function and visual quality within an eco-friendly residential complex.

2 MATERIALS AND METHODS

2.1 Study Site and Period

This research was conducted at Taman G-Walk CitraLand Musi II Palembang, located on Jalan Nasional Yusuf Mayjen Singadekane Keramasan, Kertapati District, Palembang City, South Sumatra Province (coordinates: 3°01'46"S 104°43'09"E, elevation 6 m). The study was carried out from October 2024 to January 2025 (Figure 1).

Figure 1: Location of the study site (G-Walk CitraLand Musi II Park parking area, outlined in yellow)

2.2 Tools and Materials

The tools used included stationery, a camera, a laptop, and computer programs such as AutoCAD 2019, CapCut, Google Earth, Google Form, GPS, PlantNet, Realtime Landscape Architect App, SketchUp Pro 2024, Enscape, and a smartphone. The materials consisted of data and information on the park parking area, photographs of existing conditions, and responses from managers (through interviews) and visitors (through questionnaires).

2.3 Research Methods

The research employed a field survey approach with data collection techniques including observation, questionnaire distribution, and literature study. Observations were used to obtain data on parking area characteristics such as parking volume, parking accumulation, parking turnover, parking space capacity, parking provision, parking index, parking needs, landscape photographs, as well as temperature and humidity. Questionnaire sheets were used to obtain Scenic Beauty Estimation (SBE) assessment data as well as perceptions and preferences of respondents.

The working stages were as follows: preparation, problem identification, literature study, inventory, survey preparation, data processing, parking need level analysis, landscape arrangement assessment and evaluation, concept synthesis, consultation with experts and managers, and final results in the form of 2D and 3D designs.

3 RESULTS AND DISCUSSION

3.1 Climate and Physical Data

Climate is a major factor affecting plant growth. The research location has an average temperature of 29.3°C, humidity of 79.1%, rainfall of 12.7 mm/year, and irradiation duration of 8.3 hours/day (Source: South Sumatra Climatology Station, 2024). Monthly climate data for Palembang City in 2024 are presented in Table 1.

Table 1: Climate data of Palembang City in 2024

Month	Avg. Temp (°C)	Humidity (%)	Rainfall (mm)	Sunlight (h)
January	29.2	80.5	17.6	9.1
February	28.9	82.4	16.2	8.9
March	29.8	78.7	14.8	8.7
April	30.1	79.3	18.9	8.1
May	30.4	77.1	12.2	9.0
June	30.3	76.2	10.8	7.4
July	28.8	77.3	4.6	8.0
August	29.2	75.4	0.2	8.0
September	28.8	76.4	12.0	8.0
October	29.4	76.8	14.6	8.0
November	28.2	84.0	17.7	8.0
December	28.1	84.9	12.6	8.0

3.2 Parking Inventory and Analysis

Based on field survey results, the existing parking area of G-Walk Park CitraLand Musi II Palembang totals 3,449.01 m^2, consisting of a car parking area of 2,825.99 m^2 and a motorcycle parking area of 623.02 m^2 (Table 2). The existing parking pattern uses a 90° angle (Figure 2), which provides higher capacity compared to parallel parking but offers lower ease and comfort for drivers when maneuvering in and out of spaces compared to smaller angles.

Table 2: Existing parking area data (2024 field data)

Parking Type	Area (m^2)
Car	2,825.99
Motorcycle	623.02
Total	**3,449.01**

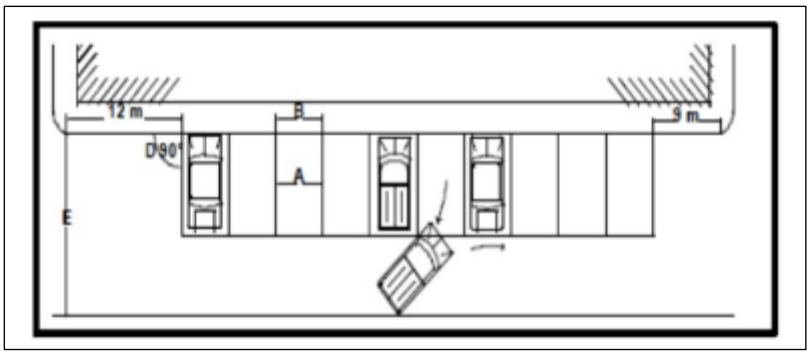

Figure 2: Existing 90° parking pattern (Source: Technical Guidelines for Parking Facilities, 1998)

Parking accumulation data collected from 18 to 24 December 2024 showed that the maximum car parking accumulation occurred on 19 December 2024 at 11:00–13:00 WIB with 34 vehicles, while the maximum motorcycle accumulation occurred on 20 December 2024 at 09:00–10:00 WIB with 22 vehicles (Tables 3 and 4). The highest parking volume for cars occurred on 20 December 2024 (37 vehicles), while the highest motorcycle volume occurred on 22 December 2024 (43 vehicles). Available parking spaces were 80 for cars and 90 for motorcycles. The maximum turnover rate for cars was 5.71 vehicles/day/space on 24 December 2024, and for motorcycles was 4.28 vehicles/day/space on 19 December 2024.

Analysis of parking space requirements based on the parking space unit (SRP) of 0.75 × 2 m for motorcycles and 2.3 × 5 m for cars indicated that the available parking land was sufficient to accommodate the number of vehicles parked during the observation period.

Table 3: Car parking accumulation (18–24 December 2024)

No	Date	Peak Time	Accumulation
1	18 Dec 2024	13:00–15:00	8
2	19 Dec 2024	11:00–13:00	34
3	20 Dec 2024	09:00–10:00	30
4	21 Dec 2024	14:00–15:00	12
5	22 Dec 2024	13:00–14:00	22
6	23 Dec 2024	14:00–15:00	7
7	24 Dec 2024	14:00–15:00	4

Table 4: Motorcycle parking accumulation (18–24 December 2024)

No	Date	Peak Time	Accumulation
1	18 Dec 2024	13:00–15:00	1
2	19 Dec 2024	11:00–13:00	20
3	20 Dec 2024	09:00–10:00	22
4	21 Dec 2024	14:00–15:00	3
5	22 Dec 2024	13:00–14:00	14
6	23 Dec 2024	14:00–15:00	8
7	24 Dec 2024	14:00–15:00	4

3.3 Biological Data and Visual Landscape Assessment

Vegetation inventory identified several plant species at the site, including lily (Crinum asiaticum), banana (Musa paradisiaca L.), snowbush (Breynia disticha), asoka flower (Ixora coccinea L.), Brazilian fern, tabebuya (Handroanthus chrysotrichus), talipot palm (Corypha umbraculifera L.), and mini elephant grass (Pennisetum purpureum cv. Dwarf). Tree plants are prioritized in the parking area because they provide shade for vehicles from sunlight. Groundcover plants help improve soil fertility, control water, weeds, pests, and diseases. Shrub plants with many branches and lower height than trees also play an important role.

Interviews with the site manager (Mr. Nasir) indicated that while most vegetation received periodic watering and care, some planting media had become dry, barren, and dusty, reducing plant growth quality. Park revitalization is currently in progress as part of the commercial area development program of G-Walk Park.

Aesthetic quality assessment of the parking area landscape was conducted using the Scenic Beauty Estimation (SBE) method based on responses from 30 respondents (12 males and 18 females, aged 20–55 years, consisting of students, employees, lecturers, and others). Eighteen landscape characters were evaluated and classified into three beauty levels: low (SBE 0–20), medium (SBE 21–41), and high (SBE 42–63). The results showed that landscapes with higher vegetation coverage received higher SBE scores, while landscapes dominated by damaged hard elements and limited vegetation received lower scores (Table 5).

Table 5: Classification of Scenic Beauty Estimation (SBE) values – existing condition (selected points)

Landscape	Avg. Rating	SBE Score	Classification
L1	4.00	7	Low
L2	3.96	3	Low
L3	4.36	43	High
L4	4.43	50	High
L5	4.26	33	Medium
L8	3.93	0	Low
L12	4.56	63	High
L13	4.20	27	Medium

Note: Full data covered L1–L18. Low = SBE 0–20; Medium = SBE 21–41; High = SBE 42–63.

3.4 Design Concept and Results

The design of the parking area prioritizes order, aesthetics, and functionality through the use of paving blocks that support drainage and create a neat appearance. Vegetation in the form of trees and small plants is planted to increase comfort and balance between green and built spaces. A high fence with artistic murals adds aesthetic value while strengthening place identity. Adequate lighting supports user safety at night. An orderly layout with wide vehicle lanes facilitates maneuvering.

Based on SBE results, landscape points with the highest scores were those with more vegetation. Landscapes with medium to low scores were dominated by damaged hard elements and limited vegetation. The selected plants are resistant to full sunlight, partial shade, and full shade according to tropical conditions. Plants used in the design include trees (Ketapang Kencana / Terminalia mantaly, Flamboyan / Delonix regia), shrubs (Purple Lantana / Lantana camara, Marigold / Tagetes erecta, Calathea, Blood Sambang / Excoecaria cochinchinensis, Geranium / Pelargonium), and groundcover (Mini Elephant Grass / Axonopus compressus). Physical facilities provided include benches, lighting, direction signs, bicycle parking, garbage bins, and circulation paths.

The design was developed in five zones. Zone 1 (central island area) incorporates Geranium ornamental plants as a view barrier and Ketapang Kencana trees as a central feature. Zone 2 applies an efficient vehicle circulation pattern with clear entry and exit lanes, flowering shrubs, groundcover forming geometric borders, and protective trees along the perimeter. Zone 3 adds vegetation elements as a visual barrier between the parking area and pedestrian spaces. Zone 4 arranges four-wheeled vehicle parking linearly with clear markings, Calathea as a visual filter, and protective trees at intervals. Zone 5 emphasizes efficient circulation, protective trees for shade, and garden lights along pedestrian paths. Representative 3D visualizations of the redesigned parking area are presented in Figures 3–7.

Figure 3: 3D rendering of the redesigned parking area with flamboyan trees and planting beds

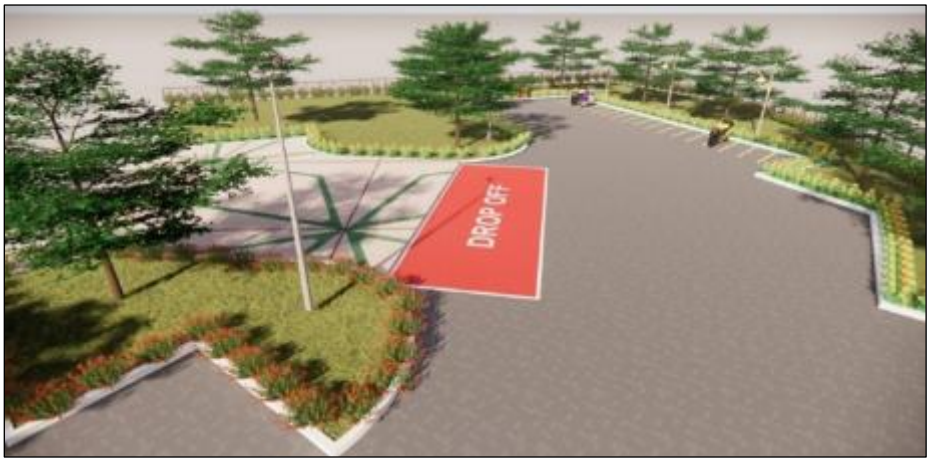

Figure 4: 3D rendering of the drop-off area with surrounding vegetation

Figure 5: 3D perspective view of the parking lanes with shade trees

Figure 6: Aerial 3D view of parking bays with flowering shade trees

Figure 7: Overall 3D perspective of the redesigned parking area under Ecological Architecture concept

3.5 Post-Design SBE Evaluation and Cost Estimate

The redesigned parking area was reassessed using the SBE method. The results showed a substantial increase in beauty values. Before the design, SBE scores ranged from 0 to 63 (low to medium categories). After the design, some points reached scores of up to 147, classified as high beauty (Table 6). This increase demonstrates that the landscape design successfully improved the visual quality of the parking area and provided better comfort and satisfaction for users.

Table 6: SBE values after design implementation (selected points)

Landscape	Avg. Rating	SBE Score	Classification
L1	5.00	147	High
L2	4.22	69	Medium
L3	4.13	60	Medium
L4	4.43	90	Medium
L5	3.53	0	Low

Note: Post-design classification — Low: SBE 0–49; Medium: SBE 50–98; High: SBE 99–147.

The estimated total cost for implementing the proposed parking area design is Rp 872,201,980. This amount includes preparation work, garden work, plant work, miscellaneous facilities, finishing, value-added tax (12%), overhead and profit (15%), and Detail Engineering Design (7%). A summary of the cost breakdown is presented in Table 7.

Table 7: Recapitulation of the Cost Budget Plan (RAB)

Job Description	Total Price (Rp)
A. Preparation Work	167,594,000
B. Garden Work	355,835,000
C. Plant Work	61,698,000
D. Miscellaneous Work	32,270,000
E. Finishing Work	62,500,000
Subtotal	650,897,000
VAT (12%)	78,107,640
Overhead and Profit (15%)	97,634,550
DED (7%)	45,562,790
TOTAL	872,201,980

4 DISCUSSION

Needs analysis based on vehicle accumulation, parking volume, and maximum parking index indicated that the existing parking capacity and circulation are not optimal in accommodating vehicles during peak hours. Visual assessment of the landscape revealed a lack of shade, resulting in suboptimal temperature and thermal comfort. Changing the parking pattern from 90° to 60° is recommended. The 60° pattern offers several advantages: easier maneuverability (drivers can enter and exit with less directional correction, reducing congestion potential) and greater efficiency of aisle space compared to the 90° pattern, allowing optimization of the parking area without significantly reducing capacity.

Comparison of SBE values before and after design confirms that landscapes dominated by vegetation achieve higher aesthetic preference, while those dominated by poorly functioning hard elements score lower. The Ecological Architecture approach successfully integrates parking function with aesthetic values, environmental friendliness, and improved user comfort. The design combines utility functions and visual aesthetics through the arrangement of hardscape and softscape elements, contributing positively to the overall quality of the G-Walk CitraLand Musi II Park area within an eco-friendly residential complex.

5 CONCLUSION

Based on the evaluation of the parking area arrangement at G-Walk Park CitraLand Musi II Palembang, the following conclusions are drawn:

- The currently implemented 90° parking pattern is less efficient and not optimal in meeting space requirements and user comfort, especially during peak hours.
- Analysis of functional and aesthetic needs indicates that changing the parking pattern to 60° can increase the efficiency of maneuvering space and provide better comfort and safety for car and motorcycle drivers.
- The Ecological Architecture approach in landscape design is able to integrate parking functions with aesthetic values, is more environmentally friendly, and makes a positive contribution to user access and vehicle parking experience.
- Measurement results using the Scenic Beauty Estimation (SBE) method showed a significant increase in beauty values. Before the design, SBE values ranged from low to medium beauty categories (highest score 63). After the design, SBE values increased substantially, with some points reaching 147 (high beauty category). This increase demonstrates that the landscape design successfully improved the visual quality of the parking area and provided better comfort and satisfaction for users.
- The estimated cost of implementing the proposed design is Rp 872,201,980, inclusive of physical development, planting, taxes, overhead, and detailed engineering design.

SUGGESTIONS

- Future studies should expand the scope of the research object to involve other parking areas with different characteristics in order to obtain a more comprehensive parking landscape design applicable to a variety of site conditions.

- Periodic post-implementation monitoring and evaluation should be conducted to assess the effectiveness of the design in improving user comfort and satisfaction.

STATEMENTS ON COMPLIANCE WITH ETHICAL STANDARDS

Acknowledgments

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Disclosure of conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

Statement of ethical approval

This study involved field observations and voluntary questionnaire responses from adult respondents. Informed consent was obtained from all participants prior to data collection. No human clinical trials or animal experiments were conducted. The research was conducted in accordance with institutional ethical guidelines of the Faculty of Agriculture, Sriwijaya University.

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