

Evaluation of Green Building Implementation in the Bogor City Library and Gallery Based on the Greenship for New Building v1.2 Assessment Tool

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Abstract

Green buildings or Bangunan Gedung Hijau (BGH) are buildings that meet the Building Technical Standards and have significant measurable performance in saving energy, water, and other resources through the application of BGH principles in accordance with functions and classifications in each stage of its implementation. The purpose of the research is to evaluate and analyze the implementation of green building based on the Greenship for New Building v1.2 assessment tool from the Green Building Council Indonesia (GBCI), as well as provide recommendations for improvements in the Bogor City Library and Gallery Building. The method used is descriptive evaluative in describing and evaluating the conditions and existing data of the Bogor City Library and Gallery regarding the implementation of green building. Data was obtained through field surveys, document analysis, and interviews with building managers. The assessment covers six categories: Appropriate Site Development (ASD) gets 12 points, Energy Efficiency and Conservation (EEC) gets 11 points, Water Conservation (WAC) gets 11 points, Material Resources and Cycles (MRC) gets 4 points, Indoor Health and Comfort (IHC) gets 8 points, and Building Environment Management (BEM) gets 5 points. The score achieved was 51 out of 101 points, meeting the requirements for Silver certification. Recommendations for improvements that can be made to increase points at the Bogor City Library and Gallery Building include: making a ground water tank, installing 41 units of CO₂ sensors, renting a dB meter for 3 days to calculate noise levels. The cost required to implement repair solutions for the Bogor City Library and Gallery Building to increase the final Gold rating by 60 points is IDR 334,450,000.

Keywords: Green Building, Greenship, Library and Gallery, Evaluation, Implementation

1. INTRODUCTION

Buildings contribute significantly to global emissions, with 39% of CO₂ emissions and 36% of global energy consumption attributed to this sector. To mitigate environmental impacts, Indonesia has adopted green building standards, formalized through Greenship by the Green Building Council Indonesia (GBCI). Public buildings like libraries, despite their educational role, often lack such environmental integration. The Bogor City Library and Gallery building has not yet implemented an assessment based on the six aspects of the green building criteria from GBCI. The Bogor City Library and Gallery serves as a case study to assess green building performance using Greenship for New Building v1.2 assessment tool.

2. METHODS

The research method used is descriptive method with an analytic and evaluative approach. In this study, the types of data used are primary data (observations, measurements, surveys) and secondary data (architectural drawings, technical reports, policy documents). Instrument used in this study was conducted using the Greenship New Building v1.2 assessment tool.

2.1 Study Area

The location of the research is in the Bogor City Library and Gallery building which is located at Jl. Kapten Muslihat No.21, Pabaton, Central Bogor District, Bogor City, West Java. Geographically, the Bogor City Library and Gallery is located at the coordinates of 6° 35' 46.626" S and 106° 47' 35.223" E. The Bogor City Library officially opened on December 19, 2022 to the public. The Bogor City Library and Gallery building consists of 4 floors.

2.2 Green Building

Green buildings is a new building that is planned to be built or a building that has been built where in the stages of its construction to the operation of the building pay attention to the surrounding environmental conditions such as saving, reducing, protecting and wisely using land. Building Green Building can reduce operational costs and

Maintenance building in the long term despite the cost of building construction Green Building more expensive than with conventional buildings because they use environmentally friendly technology and materials. (GBCI, 2016)

2.3 GreenShip for New Building v1.2

GreenShip is one of the green building certification programs in Indonesia. The assesment tools used to evaluate the implementation of green building in this study was greenShip for new building v1.2 from Green Building Council Indonesia (GBCI) consist of 6 eligibility, 6 categories: Appropriate Site Development (ASD), Energy Efficiency and Conervation (EEC), Water Conservation (WAC), MaterialResource and Cycle (MRC), Indoor Health and Comfort (IHC), Building Environment Management (BEM), 8 pre-requisite criteria and 37 credit criteria. The GreenShip for New Building v1.2 Points and Criteria summary are shown in Tabel 1.

Tabel 1. GreenShip for New Building v1.2 Points and Criteria Summary

Category	Points			Criterion		Number of Criteria
	Credit	Bonus	Prerequisite	Credit	Bonus	
ASD	17		1	7		8
EEC	26	5	2	4	1	7
WAC	21		2	6		8
MRC	14		1	6		7
IHC	10		1	7		8
BEM	13		1	7		8
Sum	101	5	8	37	1	46

(Source: Analysis Results, 2025)

1.1 GreenShip Rating Level

Rating rating level greenShip for new building GBCI's v1.2 can be seen in table 2.

Tabel 2. GreenShip for New Building v1.2 Rating Levels

Rank	Percentage	Minimum grade
<i>Platinum</i>	73 %	74
<i>Gold</i>	57 %	58
<i>Silver</i>	46 %	47
<i>Bronze</i>	35 %	35

(Source: Analysis Results, 2025)

2. RESULT AND DISCUSSION

2.1 Eligibility

Before evaluating the implementation of green building on The Bogor City Library and Gallery Building, the building need to fulfill six eligibility requirements: (1) the minimum building area is 2500 m2, (2) the building function is in accordance with land use based on the local environment, (3) ownership Analisis Mengenai Dampak Lingkungan Hidup (AMDAL) documents and / or Upaya Pengelolaan Lingkungan Hidup (UKL) / Upaya Pemantauan Lingkungan Hidup (UPL) documents, (4) building compliance with fire safety standards, (5) building compliance with earthquake standards, and (6) building compliance with disability accessibility standards set by GBCI based on laws and regulations set by the government. The analysis result of eligibility requirements of The Bogor City Library and Gallery are shown in Table 3.

Tabel 3. Analysis Result of Eligibility Requirements for Bogor City Library and Gallery

Yes	Criteria	Information
1	Minimum Building Area Is 2500 m2	Meet
2	Building Functions in Accordance with Land Allocation Based on Local RTRW	Meet
3	Ownership of AMDAL or UKL/UPL	Meet
4	Building's Conformity to Fire Safety Standards	Meet
5	Building Conformity to Earthquake Resistance Standards	Meet
6	Building Conformity to Disability Accessibility Standards	Meet

(Source: Analysis Results, 2025)

2.2 Appropriate Site Development (ASD)

The Appropriate Site Development (ASD) category consists of 1 prerequisite criteria and 7 main criteria. The results of the analysis evaluation of green building implementation on The Bogor City Library and Gallery Building are shown in Tabel 4.

Tabel 4. ASD Evaluation Results

Categories and Criteria		GBCI V1.2 Maximum Points	Evaluation Result Points
<i>Appropriate Site Development (ASD)</i>			
ASD P	Green Base Area	P	P
ASD 1	Site Selection	2	2
ASD 2	Community Accessibility	2	2
ASD 3	Public Transportation	2	2
ASD 4	Bicycle Facilities	2	1
ASD 5	Landscaping on Land	3	3
ASD 6	Microclimate	3	2
ASD 7	Rainwater Runoff Management	3	0
Total Value of ASD Category		17	12

(Source: Analysis Results, 2025)

2.3 Energy Efficiency and Concervation (EEC)

The Energy Efficiency and Concervation (EEC) category consists of 2 prerequisite criteria, 4 main criteria and 1 bonus criteria. The results of the analysis evaluation of green building implementation on The Bogor City Library and Gallery Building are shown in Tabel 5.

Tabel 5. EEC Evaluation Results

Categories and Criteria		GBCI V1.2 Maximum Points	Evaluation Result Points
Energy Efficiency and Conservation (EEC)			
EEC P1	Electrical Sub Metering	P	P
EEC P2	OTTV Calculation	P	P
EEC 1	Energy Efficiency and Conservation Measures	20	9
EEC 2	Natural Lighting	4	0
EEC 3	Ventilation	1	1
EEC 4	Climate Change Imoact	1	1
EEC 5 (BONUS)	On-Site Renewable Energy	5	0
Total Value of EEC Category		26	11

(Source: Analysis Results, 2025)

2.4 Water Conservation (WAC)

The Water Conservation (WAC) category consists of 2 prerequisite criteria and 6 main criteria. The results of the analysis evaluation of green building implementation on The Bogor City Library and Gallery Building are shown in Tabel 6.

Tabel 6. WAC Evaluation Results

Categories and Criteria		GBCI V1.2 Maximum Points	Evaluation Result Points
Water Conservation (WAC)			
WAC P1	Water Metering	P	P
WAC P2	Water Calculation	P	P
WAC 1	Water Use Reduction	8	8
WAC 2	Water Features	3	3
WAC 3	Water Recycling	3	0
WAC 4	Alternative Water Resources	2	0
WAC 5	Rainwater Harvesting	3	0
WAC 6	Water Efficiency Landscaping	2	0
Total Value of WAC Category		21	11

(Source: Analysis Results, 2025)

2.5 Material Resource and Cycle (MRC)

The Material Resource and Cycle (MRC) category consists of 1 prerequisite criteria and 7 main criteria. The results of the analysis evaluation of green building implementation on The Bogor City Library and Gallery Building are shown in Tabel 7.

Tabel 7. MRC Evaluation Results

Categories and Criteria		GBCI V1.2 Maximum Points	Evaluation Result Points
Material Resource Cycle (MRC)			
MRC P	Refrigerant Fundamental	P	P
MRC 1	Building and Material Reuse	2	0
MRC 2	Environmental Friendly Material	3	0
MRC 3	Not ODS Usage	2	1
MRC 4	Certified Wood	2	1
MRC 5	Prefabricated Materials	3	0
MRC 6	Regional Material	2	2
Total Value of MRC Category		14	4

(Source: Analysis Results, 2025)

2.6 Indoor Health and Comfort (IHC)

The Indoor Health and Comfort (IHC) category consists of 1 prerequisite criteria and 7 main criteria. The results of the analysis evaluation of green building implementation on The Bogor City Library and Gallery Building are shown in Tabel 8.

Tabel 8. IHC Evaluation Results

Categories and Criteria		GBCI V1.2 Maximum Points	Evaluation Result Points
Indoor Health and Comfort (IHC)			
IHC P	Outdoor Air Introduction	P	P
IHC 1	CO2 Monitoring	1	0
IHC 2	Environmental Smoke Control	2	2
IHC 3	Chemical Pollutant	3	3
IHC 4	Outside View	1	1
IHC 5	Visual Comfort	1	1
IHC 6	Thermal Comfort	1	1
IHC 7	Acoustic Level	1	0
Total Value of IHC Category		10	8

(Source: Analysis Results, 2025)

2.7 Building Environment Management (BEM)

The Building Environment Management (BEM) category consists of 1 prerequisite criteria and 7 main criteria. The results of the analysis evaluation of greenbuilding implementation on The Bogor City Library and Gallery Building are shown in Tabel 9.

Tabel 9. BEM Evaluation Results

Categories and Criteria		GBCI V1.2 Maximum Points	Evaluation Result Points
Building Environment Management (BEM)			
BEM P	Basics Waste Management	P	P
BEM 1	GP as a Member of Project Team	1	0
BEM 2	Pollution of Construction Activity	2	2
BEM 3	Advanced Waste Management	2	2
BEM 4	Proper Commissioning	3	0
BEM 5	Green Building Submission Data	2	0
BEM 6	Fit Out Management	1	1
BEM 7	Occupant Survey	1	0
Total Value of BEM Category		13	5

(Source: Analysis Results, 2025)

2.8 Greenship for New Building v1.2 Evaluation Results

Analysis and evaluation of green building implementation based on Greenship for New Building v1.2 assessment tools on The Bogor City Library and Gallery building has the results shown in the Tabel 10.

Tabel 10. *Greenship for New Building v1.2* Bogor City Library and Gallery Building

Category	GBCI V1.2 Maximum Points	Evaluation Result Points
ASD	17	12
EEC	26	11
WAC	21	11
MRC	14	4
IHC	10	8
BEM	13	5
Total	101	51

(Source: Analysis Results, 2025)

The number of points obtained as a result of the implementation evaluation Green Building Using the assessment tool greenship for new building v1.2 of each category on Bogor City Library and Gallery Building is 51 points out of a maximum total of 101 points. Bogor City Library and Gallery Building Get Ranked Silver who have a minimum number of points of 47 points with a total of 51 evaluation points.

2.9 Improvement Recommendations

2.9.1 Ground Water Tank

The recommendation for the benchmark requirements of the ASD 7, WAC 5, and WAC 6 are to design and build ground water tank with a capacity of 60 m³ with a depth of 2 m, it is a repair solution that can be done to reduce rainwater runoff that falls from the roof and building land to the surrounding drainage network, for the storage of rainwater that falls from the roof and land, and for alternative water sources other than PDAM water. The cheapest cost can be calculated is Rp. 240,000,000.

2.9.2 CO2 Censors

The recommendation for the benchmark in the IHC 2 category is to install 41 CO2 sensors that functions to ensure the amount of fresh air in the room and maintain CO2 concentrations. The cost required to implement this repair solution is IDR 94,300,000.

2.9.3 dB Meter

Decibel meters are used to measure sound or noise pressure levels by measuring sound pressure in decibels (dB). These results meet the benchmark requirements of the IHC criterion 7. Decibel meters are rented for 3 days at a cost of IDR 50,000/day. The cost required to implement this repair solution is IDR 150,000.

2.9.4 Recommendation Result

Three categories that received additional score after recommendation are: (1) ASD with additional 3 points, (2) WAC with additional 4 points, (3) IHC with additional 2 points. The final ranking of the recommendation results increase to Gold rating with 60 points requires a cost of IDR 334,450,000 (Three Hundred Thirty-Four Million Four Hundred and Fifty Thousand Rupiah).

3. CONCLUSIONS

The Bogor City Library and Gallery has met the criteria for a silver tier green building with the assessment covers six categories: Appropriate Site Development (ASD) gets 12 points, Energy Efficiency and Conservation (EEC) gets 11 points, Water Conservation (WAC) gets 11 points, Material Resources and Cycles (MRC) gets 4 points, Indoor Health and Comfort (IHC) gets 8 points, and Building Environment Management (BEM) gets 5 points. And the total point earned was 51 out of 101 points. But Bogor City Library and Gallery has not yet met the criteria for a higher rating. Recommendations for improvements that can be made to increase points at the Bogor City Library and Gallery Building include: making a ground water tank, installing 41 units of CO2 sensors, renting a dB meter for 3 days to calculate noise levels. The cost required to implement repair solutions for the Bogor City Library and Gallery Building to increase the final Gold rating by 60 points is IDR 334,450,000 (Three Hundred Thirty-Four Million Four Hundred and Fifty Thousand Rupiah).

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