Reliability Evaluation of Public Building: Case Study Atrium Premiere Hotel Yogyakarta, Indonesia

D L C Galuh
Civil Engineering Program, Universitas Sarjanawiyata Tamansiswa, Yogyakarta - Indonesia
Corresponding author: galuh1985@gmail.com

Abstract. Accordance with Regional Regulation of Sleman Regency No 5/2011, it is important to check the reliability of existing public buildings, to know the capacity of buildings and services to consumers. The study aims to evaluate the reliability of Atrium Premiere Hotel, as one of hotels in Yogyakarta which is located on the main street of Yogyakarta. The methodology used with building inspection data collection and comparison of existing data with PUSLITBANG standard reference Housing and Settlement in 2016 on the inspection process. Building reliability check results based on architectural components, structures, utilities, accessibility, building codes and environments with percentages were 9.9%, 30%, 50%, 4.75% and 5%, respectively. The conclusion of the examination results shows that total value of Atrium Premiere Hotel reliability of 99.65%, so declared reliably.

Keywords: reliability, evaluation, public building

1. Introduction
The buildings as a shelter for humans from environmental disturbances, so we can perform various daily activities and self-development. Based on Regional Regulation no. 5 year 2011, building functions may include occupancy, religious, business, social, and culture, as well as special functions [1]. This is the basis of building planning, given the live load and the dead that occur will be different based on the function of the building. Changes in the function of the building must be approved and re-establishment by officials designated by the Regent in accordance with applicable laws and regulations. Building facilities and infrastructure aims to provide services in terms of health, security, safety, comfort and convenience to residents or consumers. So that the building can be said to be reliable if the technical and administrative requirements are in accordance with its function [1].

Based on the Regulation of the Minister of Public Works in 2007 stated that Certificate of Feasible Building Function is a certificate issued by local government except for special function building buildings by the Government to declare the functionality of a building either administratively or technically, prior to its utilization [2]. This is the basis for the government to provide health, safety, comfort and safety services public buildings in the community, especially in Sleman.

2. Research Objectives
The aim of this study to know the eligibility of Building Hotel Atrium Premiere based on Standard PUSLITBANG 2016 about housing and settlements [3].
3. Research Methods

3.1. Research Location
The study was conducted at Atrium Premiere hotel jl. Laksda Adisucipto no. 157 A, Catur Tunggal, Yogyakarta.

3.2. Data Source
Sources of research data include:
1. Primer data, data taken base direct inspection results to Hotel Atrium Premiere and interview with the engineering or hotel manager atrium premier.
2. Data seconder in the form of a land certificat, IMB (Building Permit), sub-drawing document of the atrium premier hotel and letters of recommandation issues from the relevant office.

3.3. Implementation of Research
Checking the reliability of premiere atrium hotel building includes several aspects, architecture, structural, utility and fire protection, accessibility, building and environmental. The feasibility of building outline aspects of safety, health, comfort and convenience can be appropriate. The implementation of the research starts from the examination of the completeness of administrative documents including: IMB, as built drawing, Land Proof Certificate, UKL-UPL and Usage Permit (Hydrant Installation, Lightning, Lift, and Power Plant). The examination was done at the study site comparing the secondary data that had been obtained with the latest condition. At the examination, the primary data are concrete compressive strength test, noise measurement, building height measurement, GSB and evacuation route. The results of the examination in writing in the list of checks the feasibility of building function.

3.4. Flowchart of Research
Flow chart of research conducted at the Hotel Atrium Premier can be seen in Figure 1. The data collected will be analysed and will be given a scoring to determine the value of building reliability. The criterion of building reliability value based on [4] research which can be seen in Table 1.

Figure 1. Flowchart of research.
Table 1. The criterion of building reliability value of building [4].

| No. | Aspect                          | Assessment criteria (%) | Percentage (%) |
|-----|---------------------------------|-------------------------|----------------|
|     |                                 | Reliable | Less reliable | Not reliable |                  |
| 1.  | Architecture                    | 95 - 100 | 75 - < 95      | < 75         | 10              |
| 2.  | Structural                      | 95 - 100 | 85 - < 95      | < 85         | 30              |
| 3.  | Utility and fire protection     | 95 - 100 | 95 - < 99      | < 95         | 50              |
| 4.  | Accessibility                   | 95 - 100 | 75 - < 95      | < 75         | 5               |
| 5.  | Building and environmental      | 95 - 100 | 75 - < 95      | < 75         | 5               |
|     | Amount                          |           |               |              | 100             |

4. Results and Discussion

Hotel Atrium Premiere consists of 1 building and is a typical building consisting of 6 floors of building and 1 basement. The basement floor serves as a parking lot. Floor 1 serves as a lobby and meeting room. 2nd to 6th floors functioned as lodging, with a total of 105 rooms divided into 5 floors.

4.1. Architectural Components
The result of reliability assessment on architecture component of Atrium Premiere Hotel can be seen in Table 2, Figure 2 and Figure 3.

Table 2. Reliability value of architectural components.

| Component | Number | Sub component [4]                        | Results |
|-----------|--------|------------------------------------------|---------|
| Indoor    | 1      | Compatibility of the use of functions    | 1,5     |
|           | 2      | Upper floor coating                      | 1       |
|           | 3      | Floor plastering                         | 1       |
|           | 4      | Wall coverings (paint)                   | 1       |
|           | 5      | Plastering walls                         | 1       |
|           | 6      | Doors / Windows                          | 1,5     |
|           | 7      | Ceiling upholstery                       | 1       |
| Outdoor   | 1      | Rooftop cover                            | 0,9     |
|           | 2      | The upholstery of the outer wall         | 0,25    |
|           | 3      | Plastering the outer floor face          | 0,3     |
|           | 4      | Plastering the outside floor             | 0,25    |
|           | 5      | Upholstery of the outer ceiling          | 0,2     |
| Amount    |        |                                          | 9,9     |
| Percentage|        |                                          | 99 %    |
Based on the results of the examination on architectural components, Hotel Atrium Premiere has met the reliable requirements of 99%. Architectural conditions in the inner room there is no damage such as cracks in walls or floors. Conditions on the outer space, seen some cracks on the walls of the Hotel Atrium Premiere.

4.2 Component Structure

The result of reliability assessment on structural component of Atrium Premiere Hotel can be seen in Table 3, Figure 4, and Figure 5.

Table 3. Reliability value of structural components.

| Component | Number | Sub component [4]                     | Results |
|-----------|--------|--------------------------------------|---------|
| Bottom structure | 1 | Foundation, head & beam foundation | 7,5     |
| Top structure | 1 | Walls brick pairs / bricks | 9       |
|             | 2 | Practical columns / blocks | 6       |
|             | 3 | Floor slab | 1,35    |
|             | 4 | Roof slab | 0,15    |
|             | 5 | Roof frames, wind ties, gording | 1,5     |
| Complementary structure | 1 | Ceiling order | 0,9     |
|             | 2 | Ceiling coverings | 0,6     |
|             | 3 | Ladder | 1,8     |
|             | 4 | Downstairs | 1,2     |

Examination of structural components based on sub drawings of the Premiere Atrium Hotel that are adapted to existing conditions. Taking concrete compressive strength was carried out using a hammer test tool. The results of the concrete compressive strength obtained were an average of > 30 MPa. This has met the requirements with a plan compressive strength of 25 MPa. The results obtained that the Atrium Premiere Hotel has met the reliable requirements of 100%.
4.3 Utility Components

The result of reliability assessment on utility and fire protection component of Atrium Premiere Hotel can be seen in Table 4 and Figure 6.

Table 4. Reliability value of utility and fire protection components.

| Component (Utility (50%)) | Number | Sub component [4] | Results |
|---------------------------|--------|-------------------|---------|
| 1 | Fire prevention installation | | 10 |
| 2 | Vertical transportation | | 7,5 |
| 3 | Plumbing | | 7,5 |
| 4 | Electrical installation | | 10 |
| 5 | Air conditioning | | 7,5 |
| 6 | Lightning protection installation | | 2,5 |
| 7 | Communication installation | | 5 |

| Amount | 50 |
| Percentage | 100 % |

Figure 4. Examination of columns.

Figure 5. Examination of beams.

Figure 6. Checking utility and fire protection component.

Based on the results of the examination on utility and fire protection components, Atrium Premiere Hotel already meet the reliable requirements of 100%. The utility conditions of plumbing and fire extinguishers are in good condition and get routine maintenance.
4.4 Accessibility Components
The result of reliability assessment on accessibility component of Atrium Premiere Hotel can be seen in Table 5 and Figure 7.

Table 5. Reliability value of accessibility components.

| Component                     | Number | Sub component [4] | Results |
|-------------------------------|--------|-------------------|---------|
| Accessibility (5%)            | 1      | Basic space size  | 0.75    |
|                               | 2      | Pedestrian & RAM path | 0.75  |
|                               | 3      | Parking area      | 0.5     |
|                               | 4      | Control equipment | 0.5     |
|                               | 5      | Toilet            | 1       |
|                               | 6      | Door              | 0.75    |
|                               | 7      | Elevator accessibility | 0.5  |

| Amount                        | 4.75   |
| Percentage                    | 95 %   |

Figure 7. Checking accessibility component.

The results of the check on the accessibility component, Atrium Premiere Hotel already meet the reliable requirements of 95%. Figure 7 shows basement parking areas and well-conditioned evacuation routes.

4.5 Building and Environmental Components
The result of reliability assessment on building and environmental component of Atrium Premiere Hotel can be seen in Table 6 and Figure 8. Comparison of KDB, KLB, and GSB inspection results in the field and IMB Hotel Atrium Premiere are listed in Table 7.

Field observation results obtained GSB, KDB, KLB and TB were 14.41 m, 607 m², 4229 m², and 24.45 m respective. The observation results are close to the document IMB (Building Permit). The results of inspection on building and environmental components of Hotel Atrium Premiere already meet the reliable requirements of 100%.
Table 6. Reliability value of building and environmental components.

| Aspect                  | Reference                              | Observation results          |
|-------------------------|----------------------------------------|------------------------------|
| Border Line Building (GSB) | 02.01.1460.IMB/KPTS/Taba/D/2013        | GSB = 14.41 m                |
| Basic Coefficients Building (KDB) | KDB = 59.3% (Broad Ground Floor: 607 m²) |                              |
| Floor Coefficient Building (KLB) | KLB = 4.1 (Building area: 4229 m²) |                              |
| Building height (TB)       | TB = 24.45 m                           |                              |

Table 7. The reliability value of building and environmental components.

| Component                              | No | Sub component [4] | Results |
|----------------------------------------|----|-------------------|---------|
| Building and environmental (5%)        |    |                   |         |
| 1 Suitability KDB                       | 1  |                   | 1.25    |
| 2 Suitability KLB                       | 2  |                   | 1.25    |
| 3 Suitability GSB                       | 3  |                   | 1.25    |
| 4 Suitability TB                        | 4  |                   | 1.25    |
| Amount                                  |    |                   | 5       |
| Percentase                              |    |                   | 100%    |

5. Conclusion

Building reliability check results at Hotel Atrium Premiere based on architectural components, structures, utilities, accessibility, building codes and environments with percentages were 9.9%, 30%, 50%, 4.75% and 5%, respectively. The conclusion of the examination results shows that total value of Atrium Premiere Hotel reliability of 99.65%, so declared reliably.

6. References

[1] Peraturan Daerah Kabupaten Sleman 2011 Bangunan Gedung No. 5 (Indonesia: Peraturan Daerah Kabupaten Sleman)
[2] Peraturan Menteri PU No.25/PRT/M/2007 2007 Pedoman Sertifikasi Laik Fungsi Bangunan Gedung (Indonesia: Peraturan Menteri Pekerjaan Umum)
[3] PUSLITBANG Perumahan dan Pemukiman 2016 Pemeriksaan Kelaikan Fungsi Bangunan Gedung (Indonesia: PUSLITBANG Perumahan dan Pemukiman)
[4] Priyo I H and Wijatmiko 2011 Evaluasi Keandalan Fisik Bangunan Gedung (Studi Kasus di Wilayah Kabupaten Sleman) 14 (2) 150-159