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Reliability Analysis of Commercial Buildings Post-Certificate of Functional Reliability through Document Compliance Evaluation against Technical Standards in X Regency

Cindi Yuliani, Aqli Mursadin

Faculty of Engineering, Lambung Mangkurat University,
Jalan Brigjen H. Hasan Basri, Banjarmasin, 70123, Indonesia.
cindiyuliani6@gmail.com

Abstract. The rapid economic growth in South Kalimantan has driven massive development of commercial facilities. To ensure building safety and reliability, the government mandates the possession of a Certificate of Functional Worthiness as evidence of compliance with technical standards. However, discrepancies are frequently found between administrative documents and the actual operational conditions in the field following the certificate issuance. This research aims to evaluate the compliance of technical documents for three commercial buildings in Regency X against the latest technical standards, as well as to analyze the implications of spatial function changes on structural reliability and user safety. The method employed in this study is a non-destructive visual comparative analysis. The research was conducted by juxtaposing secondary data, consisting of As-Built Drawings and technical assessment reports, against the results of observational field inspections of existing conditions. The evaluation focuses on the conformity of architectural spatial planning, the validation of structural design load assumptions resulting from functional conversion, and the reliability of fire protection systems. The results indicate significant adaptations of spatial functions in the three case studies, such as the conversion of retail areas into places of worship and the utilization of mezzanine areas inconsistent with the initial plan. These changes result in discrepancies between the live load assumptions and safety requirements stated in the documents compared to the actual conditions. Based on these findings, the building functionality status is categorized as Conditionally Eligible, requiring the owner to undertake Corrective Actions. This study recommends the implementation of risk-based technical verification and continuous monitoring to ensure long-term building reliability.

Keywords. Certificate of Functional Worthiness, Building Reliability, Change of Room Function, Structural Safety, Technical Evaluation

1. Introduction

Rapid economic growth in Indonesia, particularly in South Kalimantan Province, has become the primary driver of the construction sector. This increased activity necessitates the massive development of commercial facilities, such as retail buildings, to meet rising market demand. Along with this pace of development, the aspects of building reliability, safety, and functional worthiness have become critical parameters to ensure long-term socio-economic sustainability [1]. This issue is increasingly crucial given the complexity of managing both public and private buildings in developing regions such as X Regency [2].

To guarantee this reliability, the Indonesian Government enforces the Certificate of Functional Reliability. The Certificate of Functional Reliability serves as formal proof that a building meets technical standards and is declared safe. From an asset management perspective, the Certificate of Functional Reliability is not merely an administrative requirement but a vital governance instrument for ensuring that building failure risk mitigation is managed effectively [3]. Ideally, the Certificate of Functional Reliability documents, especially the As-Built Drawings, should accurately reflect the factual condition of the building in the field to avoid errors in future maintenance [4].

However, in the practice of maintenance and care after the issuance of the Certificate of Functional Reliability, a discrepancy often arises between administrative documents and operational reality. Field evaluations frequently indicate that neglecting technical data updates leads to undetected building performance degradation [5]. This issue stems from visual observations in X Regency, where indications show a divergence between the functions listed in the As-Built Drawings and actual daily usage. Buildings recorded administratively for specific functions often undergo undocumented adaptations. This discrepancy is frequently found in architectural aspects impacting user safety [6].

Strong indications of this phenomenon were identified specifically in three commercial buildings that obtained the Certificate of Functional Reliability in 2024: Building A, Building B, and Building C. These three buildings exhibit significant post-construction functional changes. In Building A, the third floor designed for retail was factually converted into a place of worship. In Building B, a mezzanine area was utilized as a canteen and meeting room despite existing load restrictions. Meanwhile, Building C showed indications of the second floor being used as storage and employee housing, originating from an older shophouse structure that was repurposed. Visual inspection methods serve as the initial validation step to map these functional deviations [7].

The application of room functions that do not comply with the requirements of the Certificate of Functional Reliability documents is not merely an administrative issue but carries serious technical consequences, particularly regarding structural loading risks. Theoretical analysis indicates that unilateral functional changes can cause internal force redistribution exceeding the initial design capacity of structural elements [8]. Specifically, case studies on functional conversion show potential overstress in beams and floor slabs, endangering building integrity [9]. Furthermore, load increases due to functional changes risk exceeding the existing foundation bearing capacity [10].

Referring to applicable load standards [12], the load for public gathering areas requires a significantly higher standard (4.79 kN/m²) compared to retail areas (3.59 kN/m²). This mismatch between initial design assumptions and actual loads potentially lowers the building safety factor significantly below permissible thresholds [11]. Apart from the loading aspect, this condition triggers broader questions regarding the quality and compliance of the Certificate of Functional Reliability documents themselves. Given the updates in various technical standards, there is a possibility that the technical documents accompanying the Certificate of Functional Reliability currently need to be realigned with the latest technical standard developments.

If technical documents are not updated following functional changes and the latest standards, the validity of the building reliability assessment must be re-examined. Therefore, this research aims to evaluate the compliance of the Certificate of Functional Reliability technical documents in the three case studies against the latest technical standards. Additionally, this study analyzes the implications of spatial function changes on structural reliability and formulates strategies to strengthen the verification and supervision process of the Certificate of Functional Reliability after issuance to ensure sustainable commercial building reliability in the regency.

2. Research Methods

This research employs a qualitative approach with a multi-site case study design to gain a holistic understanding of building reliability post-certification. The study was conducted in X Regency, South Kalimantan Province, from September to November 2025. The research focuses on three specific commercial buildings, referred to as Building A, Building B, and Building C, which were identified as having potential discrepancies between their administrative documents and factual conditions.

2.1. Data Collection

Data collection relies on two main sources: primary data and secondary data. Secondary data includes the Certificate of Functional Reliability documents, Technical Assessment Reports, and As-Built Drawings of the three buildings, as well as relevant regulations such as Government Regulation No. 16 of 2021 and Indonesian National Standard (SNI) 1727:2020. Primary data was obtained through direct field observations to capture visual documentation of the buildings' actual conditions and through in-depth interviews.

The data collection process applies three main techniques to ensure validity through triangulation. First, document analysis is conducted to examine and compare the technical documents against applicable standards. Second, limited field observation is performed using a non-participant approach to visually verify indications of functional changes and structural load distribution. Third, semi-structured in-depth interviews are conducted with key informants.

2.1.1. Research Participants.

The informants were selected using a purposive sampling technique based on their specific roles and relevance to the research objectives. The participants consist of three categories: Regulators (officials from the Public Works and Spatial Planning Agency involved in the verification process), Technical Practitioners (consultants and field testers responsible for the technical assessment), and Operational Staff (building employees who understand the daily operations and history of space usage).

2.2. Research Instruments

To support systematic data collection, this study utilizes a Document Compliance Analysis Matrix as the main instrument. This matrix is developed from the building functional reliability checklist found in the Ministry of Public Works and Housing Regulation. It is modified to not only audit compliance but also to analyze the gap between the documents, technical standards, and factual conditions. Additionally, field observation sheets are used to document visual findings such as room function compatibility and visible load concentrations.

2.3. Data Analysis

The collected data is analyzed using the interactive qualitative analysis model adapted from Miles and Huberman, which consists of three interacting stages: data condensation, data display, and conclusion drawing. Data condensation involves simplifying raw data from field notes, documents, and interview transcripts. The data is then displayed using comparison tables to contrast document findings with factual field conditions.

To ensure the validity and credibility of the findings, this research applies source triangulation and technique triangulation. Source triangulation compares perspectives from different informant groups (regulators, practitioners, and users). Technique triangulation compares evidence obtained from document analysis, field observation, and interviews. A finding is considered valid and credible if it is supported by consistent evidence across these different sources and methods.

3. Results and Discussion

3.1. Technical Data of Research Objects

The research was conducted in X Regency, which covers an area of 4,688.50 km². Topographically, the region is situated at an altitude ranging from 0 to 1,878 meters above sea level, where the majority of commercial activities are located in the lowlands (0-7 meters above sea level).

The study focuses on three commercial buildings located in the main corridor of Ahmad Yani Street, specifically in Kertak Hanyar District. These three buildings have obtained the Certificate of Functional Reliability and were selected to represent different retail scales:

1. Building A: A multi-story modern retail shopping center (mall) accommodating various tenants and a culinary area.
2. Building B: A large-format retail building (big box) consisting of one floor with a mezzanine structure, focusing on building materials and household supplies.
3. Building C: A neighborhood-scale retail building (minimarket) with two floors that has undergone functional modifications.

3.2. Document Compliance Analysis Results

The evaluation was conducted using the Document Compliance Analysis Matrix to map the compatibility between administrative documents, factual conditions, and applicable technical standards (Government Regulation No. 16 of 2021 and Indonesian National Standard).

3.2.1. Case Study: Building A

The analysis of Building A indicates a discrepancy between the field usage and the data recorded in the As-Built Drawings. The primary deviation is the presence of religious activities (a place of worship) on the upper floor, whereas the main function recorded in the documents is purely commercial/retail.

This functional change has implications for structural safety and evacuation requirements. Based on the Indonesian National Standard (SNI) 1727:2020, the live load standard for a place of worship (assembly area) is 4.79 kN/m², which is higher than the retail design load of 3.59 kN/m². Additionally, evacuation routes need to be adjusted for high-density crowd characteristics.

3.2.2. Case Study: Building B

For Building B, the analysis identified technical inconsistencies regarding the Mezzanine floor and the electrical protection system. The Mezzanine area, recorded in the As-Built Drawings, is utilized for operational support (Office, Prayer Room, and Server Room). However, the initial Structural Report assumed a uniform load of 1.92 kN/m², while the actual function requires a higher capacity (2.4 - 4.79 kN/m²).

Furthermore, the electrical grounding system evaluation shows a resistance value of 11 Ohm, which exceeds the ideal standard of ≤ 5 Ohm recommended by the General Regulation for Electrical Installations (PUIL 2011).

3.2.3. Case Study: Building C

The evaluation of Building C reveals that the building operates stably but requires administrative harmonization and technical mitigation. A significant finding is the utilization of space for retail storage, where the actual load (3.83 kN/m²) exceeds the initial design assumption (1.92 kN/m²). Strict load management is recommended to maintain safety.

Additionally, due to the maximization of the built-up area, the building lacks sufficient natural infiltration for drainage. Engineering compensation, such as deep well injection, is required to meet the "Zero Runoff" principle.

3.3. Field Verification Findings

To cross-validate the administrative analysis, limited field observations were conducted on the three case studies. The observation focused on visually verifying the consistency between the planning data and the existing conditions. Due to strict internal security protocols and operational policies managed by the building owners, access to certain technical areas (such as electrical panels and specific storage zones) was restricted. Therefore, the verification process applied the Precautionary Principle, assuming that unverified high-risk areas require administrative updating to ensure safety compliance.

3.3.1. Building A: Zoning and Accessibility

Field observation in Building A confirmed that the public commercial areas (1st and 2nd floors) operate consistently with the Certificate of Functional Reliability documents. However, the vertical access to the 3rd floor was restricted. Based on the document analysis which indicated a function change to a place of worship, the restricted access prevents direct visual validation of the structural load. Consequently, technical recommendations focus on harmonizing the assumed "Assembly" load (4.79 kN/m²) into the updated technical documents to accommodate future usage legally.

3.3.2. Building B: Mezzanine and Protection Systems

In Building B, the observation focused on the Mezzanine floor and the Main Distribution Board (MDB). The visual inspection was limited by the "Restricted Zone" policy. However, the zoning limits confirm that asset security management is active. The discrepancy lies in the Mezzanine load assumption (Office/Storage usage) versus the initial document (Residential load). Regarding electrical safety, the physical presence of grounding components was verified visually, although intrusive resistance testing was not performed. The findings suggest that a maintenance logbook should be used as the primary evidence of compliance for these restricted areas.

3.3.3. Building C: Site Optimization

Building C exhibits the most intensive land use. Visual verification confirms that the entire site is utilized for the building and pavement (parking), leaving minimal area for natural infiltration or setbacks. This confirms the document analysis regarding the lack of Green Coefficient (KDH) fulfillment. The intensive land use requires engineering compensation, such as artificial drainage systems, to replace natural absorption. Inside, the storage areas on the 2nd floor are heavily utilized, reinforcing the need for strict Load Management to ensure the structure is not overloaded beyond the design capacity of 1.92 kN/m².

A summary of the field verification findings for all three buildings is presented in Table 1.

Building Case	Observed Area	Visual Finding (Factual)	Technical Implication
Building A	3rd Floor Zone	Access is restricted/closed. Designated for future mixed-use purposes.	Unverified Load: Requires administrative updates to include "Assembly" function specifications in the certificate.
Building B	Mezzanine Floor	Used as Office & Support Area. Access is restricted for security.	Load Discrepancy: Actual usage load is higher than the design load. Requires strict Load Management.
Building B	Electrical Panel	Restricted access. Physical grounding installation is visible.	Compliance Check: Use periodic "Maintenance Logs" as valid evidence since direct testing is restricted.
Building C	Exterior Site	100% built-up area (Building + Paving). No natural soil absorption.	Environmental Impact: Zero Green Coefficient (KDH). Requires artificial drainage engineering.
Building C	Storage Area	High-density storage usage. Restricted access.	Structural Safety: High load concentration requires strict stacking height limits.

3.4. Qualitative Analysis of Stakeholder Perspectives

To understand the context behind the technical discrepancies found in the previous sections, in-depth interviews were conducted using source triangulation. This involved three key stakeholders: Regulators (Public Works Agency), Practitioners (Technical Consultants/Expert Team), and Operational (Building Owners/Managers). The analysis reveals the dynamics of policy implementation in the field.

3.4.1. Regulator Perspective: The Adaptive Compliance Approach

The interview with the Public Works and Spatial Planning Agency of X Regency revealed a distinct approach compared to neighboring regions. While other regions apply "Absolute Compliance" (where 100% technical fulfillment is required before issuance), X Regency adopts a "Progressive Compliance" strategy.

The key instrument in this strategy is the "Statement of Commitment" (Surat Pernyataan Kesanggupan). The regulator views this not merely as an administrative supplement but as a valid Risk Control Instrument. This policy is driven by three logical considerations:

1. Improvement Roadmap: Recognizing that immediate rectification for existing buildings is costly and time-consuming, the commitment letter serves as a legal promise to fix defects within a specific timeline.
2. Proportional Responsibility: In accordance with Government Regulation No. 16 of 2021, the responsibility for building safety and truthfulness of data lies with the Owner and the Technical Consultant. The Regulator acts as an administrator facilitating legal certainty.
3. Economic Discretion: The policy aims to balance technical enforcement with economic stability, preventing business closures due to administrative rigidities.

3.4.2. Practitioner Perspective: Conditional Verification

Technical Consultants and the Expert Professional Team (TPA) confirmed that the technical deviations identified in this study (such as the mezzanine load in Building B or the lack of infiltration in Building C) were actually identified during their assessment.

However, the mechanism used to bridge the gap between "Existing Conditions" and "Ideal Standards" is the "Commitment-Based Settlement." Practitioners report the factual conditions honestly. If a defect is non-critical to immediate structural collapse, they recommend "Conditional Functional Reliability." The owner's signature on the Commitment Letter legally binds them to future repairs, allowing the Consultant to issue a passing recommendation without violating professional ethics.

3.4.3. Operational Perspective: Business Dynamics vs. Static Regulation

The operational perspective reveals the practical challenges in implementing these commitments:

1. Adaptability vs. Rigidity (Building A): Management views the function change (Retail to Worship) as a "Tenancy Mix" strategy to optimize occupancy. They perceive the Certificate of Functional Reliability as a "Parent License," whereas regulations view functional changes as requiring a new technical assessment. This highlights a gap between dynamic business needs and static administrative records.
2. Data Privacy (Building B): The strict internal protocols regarding access to technical areas (electrical panels) reflect good governance but hinder external verification. This forces the reliance on administrative assumptions rather than direct technical proof.
3. Information Discontinuity (Building C): A significant finding is the "Knowledge Gap" in centralized retail management. The Commitment Letter is often signed by Top Management (HQ), but the operational staff (Store Managers) are unaware of its contents. This leads to a failure in implementing the committed technical fixes (e.g., maintaining drainage) because the instruction does not reach the ground level.

3.5. Discussion

Based on the empirical data gathered through triangulation (document review, field observation, and interviews), this section synthesizes the findings to understand the interaction between the ideal regulatory framework (Government Regulation No. 16 of 2021) and the actual technical adaptation in the field. The discussion aims to answer two fundamental questions: "Why" do these discrepancies occur, and "How" can the system be strengthened?

3.5.1. Analysis of Certificate of Functional Reliability Document Gaps 4.3.1.1. Case Study: Building A (Occupancy Adaptation)

The primary finding in Building A is "Occupancy Adaptation." The Certificate of Functional Reliability records the building as a single-function Commercial/Retail entity. However, factual observation confirms a mixed-use reality with religious activities on the 3rd floor. This reflects the dynamic lifecycle of commercial buildings responding to market demand.

Administratively, this change requires validation. According to the Indonesian National Standard (SNI) 1727:2020, the live load profile for Retail (3.59 kN/m²) differs from Assembly/Worship (4.79 kN/m²). Similarly, evacuation patterns for scattered shoppers differ from concentrated congregations. The recommendation is not to cease operations but to perform an "Administrative Update" to the building approval documents, ensuring that the new function is legally and technically covered.

1. Case Study: Building B (Technical Harmonization)

In Building B, the gap lies in the load assumption for the Mezzanine floor (Document: 1.92 kN/m² vs. Field: Office/Server use requiring 2.40 kN/m²) and the electrical grounding resistance (> 5 Ohm). These findings do not indicate structural failure but highlight the need for "Corrective Action." The recommended approach is "Conditional Functional Reliability," where the owner commits to strict Load Management and a routine maintenance program to improve the grounding system, verified through periodic administrative monitoring.

2. Case Study: Building C (Legacy Condition)

Building C represents the challenge of applying new regulations to existing buildings. The intensive land use (100% built-up area) conflicts with current Green Coefficient (KDH) standards. Instead of demolition, the regulator applies a "Problem Solving" approach under Article 232(8) of Government Regulation No. 16 of 2021. The solution involves "Compensatory Engineering," such as installing deep well injection for drainage, legalized through a conditional certificate that binds the owner to implement these measures.

3.5.2. Analysis of Critical Technical Parameters and Causes

The cross-case analysis identifies three critical technical parameters that consistently show discrepancies:

a. Structural Reliability Assurance: Driven by functional changes (Building A) and storage optimization (Building C), requiring strict Load Management.
b. Electrical Safety: Grounding systems often degrade over time or due to environmental factors, requiring enhanced maintenance.
c. Spatial Compliance: Legacy buildings often fail to meet modern setback and green area standards, necessitating administrative legalization through compensatory technical measures.

To understand the root causes of these gaps, a source triangulation matrix was developed, synthesizing perspectives from the Regulator, Practitioner, and Operator. The summary is presented in Table 2.

Table 2. Matrix of Causes for Certificate of Functional Reliability Gaps

No	Key Finding (Technical Variable)	Regulator Perspective (Public Works Agency)	Practitioner Perspective (Consultant/Expert Team)	Operational Perspective (Building Management)	Synthesis of Validation
1	**Spatial Adaptation** (Case Building C) Legacy condition of setbacks & green areas.	**Problem Solving Approach:** Applying adaptive policies for existing buildings. Resolved through administrative mechanisms (Statement of Commitment) to provide business legal certainty.	**Objective Identification:** Professionally recorded the existing condition "as is" and recommended technical mitigation steps attached to the	**Management Specialization:** Field units focus on service targets, while legal/spatial compliance is managed centrally by HQ.	**Regulatory Facilitation:** The regulator accommodates legacy conditions via commitment instruments (Article 232(8) GR 16/2021). The challenge is the flow of technical info from HQ to the

No	Key Finding (Technical Variable)	Regulator Perspective (Public Works Agency)	Practitioner Perspective (Consultant/Expert Team)	Operational Perspective (Building Management)	Synthesis of Validation
			licensing document.		field unit.
2	**Function & Structure Dynamics** (Case Building A & B) Room function adaptation & load management.	**Segregation of Responsibility:** Verification is valid at submission. Post-issuance dynamics are the owner's responsibility for maintenance/updating.	**Administrative Validation:** Technical recommendations regarding load and function evaluation were submitted in the assessment report as a guide for the owner.	**Operational Dynamics:** (a) Service innovation for tenancy mix. (b) Strict corporate security protocols limiting access to vital areas.	**Operational Consequence:** Regulators and Consultants followed procedures. Current variations are due to operational dynamics, requiring owners to update data (Article 293 GR 16/2021).
3	**Utility Optimization** (Case Building B & C) Grounding system performance.	**Conditional Eligibility:** Accepting the Consultant's results and granting conditional status bound by a time-based repair commitment from the owner.	**Objective Identification:** Reported actual measurements per standards (PUIL). Recommended technical revitalization or repair of the installation.	**Safety Protocol Compliance:** Verification access to Main Distribution Board (MDB) is restricted by internal safety protocols to prevent operational risks.	**Legal Assurance:** Technical notes were identified transparently. Issuance with a commitment letter allows owners to perform self-managed repairs without halting operations.

No	Key Finding (Technical Variable)	Regulator Perspective (Public Works Agency)	Practitioner Perspective (Consultant/Expert Team)	Operational Perspective (Building Management)	Synthesis of Validation
4	**Systemic Cause** Use of Statement of Commitment.	**Strategic Policy:** Discretionary policy to support Regional Economic Stability and maintain a conducive investment climate. Budget constraints limit routine physical inspections.	**Procedural Accountability:** The Expert Team validates the Commitment Letter as a formal legal guarantee for aspects requiring phased improvement.	**Corporate Commitment:** The Statement is viewed as management's seriousness to comply with regulations gradually (Progressive Compliance).	**Integrated Solution:** The Commitment Letter is a valid Policy Discretion. It balances technical compliance with limited government supervision resources.

3.5.3. Discussion Summary

The analysis reveals two main drivers for the discrepancies. First, the Policy Dimension, where regulators use "Commitment-Based Compliance" as a discretionary tool to balance economic stability with safety, compensating for budget constraints that limit physical inspections. Second, the Operational Dimension, where building management faces "Administrative Lag" (business innovation moves faster than permitting updates) and challenges in internal knowledge transfer. The discrepancies are therefore not failures of supervision, but logical consequences of the regulatory transition period, managed through adaptive compliance strategies.

3.6. Strategies for Verification and Supervision Enhancement

Based on the analysis of root causes and field dynamics, this research formulates strengthening strategies divided into three intervention phases: Verification Reinforcement (Pre-Issuance), Control (Post-Issuance), and Capacity Building (Education).

3.6.1. Strengthening the Verification Process (Pre-Issuance)

This strategy aims to support Technical Consultants and the Expert Team in producing comprehensive technical outputs as a basis for regulatory decision-making.

1. Verification of Retrofitting: To ensure technical certainty, the Technical Assessment Report should be accompanied by a "Retrofit Verification Record" from the consultant. This serves as professional validation that critical recommendations have been physically implemented before the Certificate of Functional Reliability is issued.
2. Risk-Based Reporting Transformation: Technical reports should evolve from simple checklists to "Qualitative Risk Analysis." This classification helps the Technical Agency prioritize which elements must be repaired immediately (e.g., structure and grounding) and which can be administratively tolerated, providing a strong technical basis for discretionary decisions.
3. Routine Inspection Institutionalization: In accordance with the mandate for periodic inspection, the Agency needs to encourage routine inspections. This aims to validate that building performance

remains consistent with initial planning documents and to detect early material degradation before it becomes a critical failure.

3.6.2. *Sustainable Post-Issuance Supervision*

This strategy focuses on managing buildings that are already operational, especially those with functional dynamics or administrative notes.

1. Risk-Based Sampling for Supervision: Responding to budget constraints for inspections, the supervision method should adopt "Risk-Based Sampling." Budget allocation should be focused on inspecting high-risk buildings (public centers), while low-risk buildings can be supervised through mandatory self-reporting.
2. Commitment Prioritization: The use of the Statement of Commitment must be strengthened with "Safety Priority Classification." It is recommended that administrative commitments be allowed only for non-critical aspects (aesthetic/architectural). For Safety, Health, Comfort, and Ease aspects—especially Vital Structures, Fire Protection, and Electrical Safety—physical repair must be a mandatory prerequisite before the certificate is issued. This protects the Regulator from future liability.
3. Commitment Monitoring: For buildings issued a certificate with an attached commitment letter, the Technical Agency should conduct "Periodic Supervision Audits." The commitment document should be utilized as an audit control tool to verify the progress of repairs made by the owner, ensuring the commitment is executed and not merely an administrative formality.

3.6.3. *Capacity Building and Owner Education*

This strategy aims to build awareness that building reliability is an asset investment, not a cost burden.

1. Operational Compliance Standards: To bridge the information asymmetry between central management and field operations (as seen in Case Study C), an "Annual Compliance Statement" signed by the on-site building manager is recommended. This document confirms that the building is operated according to the function stated in the certificate and that no significant functional changes have occurred without permission.
2. Asset Risk Mitigation Narrative: The Agency needs to shift its communication approach from "Regulatory Obligation" to "Asset Protection." Education should emphasize that compliance with technical standards (such as proper grounding) is the most cost-effective way to protect property assets from fire and safeguard the corporation from legal lawsuits due to operational negligence.

4. Closing

4.1. *Conclusions*

Based on the comparative analysis between administrative documents, limited field observations, and the regulatory framework of Government Regulation No. 16 of 2021 regarding the three case studies in X Regency, this research draws the following conclusions:

1. Functional Adaptation in Building A:

A post-occupancy functional adaptation was identified where the area administratively recorded as a single-function Shopping Center factually accommodates a mixed-use function with a Place of Worship. This indicates a potential difference in technical requirements (Live Load according to SNI 1727:2020 and Evacuation Management according to SNI 03-1746-2000) between the pre-certification and post-certification conditions. It is important to note that this conclusion is based on administrative and visual reviews, not on structural re-calculation or material testing. Therefore, this finding is classified as a need for administrative data updates to ensure legal certainty of the building function.

2. Conditional Eligibility Mechanism in Buildings B and C:

The evaluation of existing conditions in Buildings B and C (spatial layout, storage structural capacity, and utilities) indicates the need for administrative resolution through "Corrective Action."

Technical recommendations are formalized through the Technical Team Meeting Minutes, which outline the improvement roadmap for the owner. Based on this mechanism and referring to Article 211 Paragraph (3) of Government Regulation No. 16 of 2021, the building status is categorized as "Conditionally Eligible." This status grants operational legitimacy, with the absolute prerequisite that the owner fulfills the technical improvement commitments as recommended by the experts.

3. Integrated Strengthening Strategy

Effective strategies to strengthen the verification and supervision of the Certificate of Functional a. Reliability after issuance involve integrating four main approaches:

a. Budgetary Support Revitalization: Implementing Risk-Based Sampling for efficient supervision, focusing inspections on high-risk buildings.
b. Risk-Based Technical Verification: Transforming reporting methods from simple checklists to Qualitative Risk Analysis and requiring a Retrofit Validation Record.
c. Commitment-Based Supervision: Utilizing the Statement of Commitment as a monitoring roadmap verified through periodic audits and data transparency.
d. Capacity Building: Educating owners on asset risk management to build self-awareness in implementing standard operating procedures for maintenance.

4.2. Suggestions for Future Research

Given that this research is a case study with a qualitative-descriptive approach on three specific objects, the following recommendations are proposed to enrich scientific knowledge and provide more comprehensive data validation in future studies:

1. Expansion of Study Objects: Future research should expand the sample size by including a more diverse typology of Modern Retail/Business buildings in X Regency and its surrounding agglomeration areas. This aims to test the generalization level of the findings, determining whether functional adaptation and intensive land use are casuistic phenomena or a common pattern in the commercial property industry in the region.
2. Implementation of Quantitative Methods: To complement technical visual observation data, subsequent research is highly recommended to adopt a mixed-method approach by distributing questionnaires. The targets include Building Users (to measure perceptions of comfort and ease/evacuation access) and Building Management Teams (to measure understanding and compliance with maintenance procedures). This quantitative data will provide a new validation dimension from the end-user perspective.
3. Specific Investigative Audit: For research with broader resource access, it is recommended to proceed to the Investigative Audit stage using non-destructive testing tools. This is particularly relevant to physically validate structural capacity assumptions due to functional changes, which in this study were limited to administrative reviews. Physical validation will strengthen the scientific database regarding the safety margins of existing buildings.

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