ASSESSING COMPLIANCE AND BARRIERS IN FUNCTIONAL FEASIBILITY CERTIFICATION OF PUBLIC BUILDINGS: CASE EVIDENCE FROM BANDA ACEH, INDONESIA

HAFNIDAR ABDUL RANI[1*], TAMALKHANI SYAMMAUN[2], FIRMANSYAH RACHMAN[3], JURISMAN AMIN[4], ANDI FAHLEVI[5]
Department of Civil Engineering, Universitas Muhammadiyah Aceh, Banda Aceh
Email: hafnidar.ar@unmuha.ac.id[1], tamalkhani@unmuha.ac.id[2], firmansyah@unmuha.ac.id[3], jurisman.amin@unmuha.ac.id[4], andifahlevi99@gmail.com[5]
DOI: http://dx.doi.org/10.31869/rtj.v9i1.7511

Abstract: *The Functional Feasibility Certificate (SLF) is a legal requirement in Indonesia to ensure that buildings meet safety, health, and usability standards before being occupied, especially for public and commercial facilities. This study investigates the low adoption of SLF in public buildings in Banda Aceh, a mid-sized urban center in Indonesia. A qualitative case study approach was applied, involving direct observation and semi-structured interviews at four purposively selected sites: the BSI Landmark Building, Dr. Zainoel Abidin Regional General Hospital (Polyclinic), Kyriad Muraya Hotel, and Suzuya Mall. Results showed that only one building, the BSI Landmark had a valid SLF certificate. The remaining three lacked critical components such as fire doors, smoke detectors, and evacuation plans, despite the presence of basic safety infrastructure. Thematic analysis revealed three dominant barriers to certification: procedural complexity, limited institutional capacity, and low awareness among building managers. These findings highlight the need for streamlined digital certification systems, improved municipal support, and targeted regulatory outreach. The study contributes to the literature on urban safety governance in Indonesia and offers practical insights for strengthening disaster risk resilience and building compliance frameworks in Indonesian cities.*
Keywords: *Functional feasibility certificate, Public building safety, Building regulation*

Abstrak: Sertifikat Laik Fungsi (SLF) merupakan persyaratan hukum di Indonesia untuk memastikan bahwa bangunan memenuhi standar keselamatan, kesehatan, dan kelayakan fungsi sebelum dapat ditempati, khususnya untuk fasilitas publik dan komersial. Studi ini menelusuri rendahnya tingkat penerbitan SLF pada bangunan publik di Banda Aceh, sebuah pusat kota berukuran menengah di Indonesia. Pendekatan studi kasus kualitatif diterapkan dengan melakukan observasi langsung dan wawancara semi-terstruktur pada empat lokasi yang dipilih secara purposif: Gedung BSI Landmark, Rumah Sakit Umum Daerah Dr. Zainoel Abidin (Poliklinik), Hotel Kyriad Muraya, dan Suzuya Mall. Hasil penelitian menunjukkan bahwa hanya satu bangunan, yaitu BSI Landmark, yang memiliki sertifikat SLF yang masih berlaku. Tiga bangunan lainnya tidak memenuhi beberapa komponen krusial seperti pintu tahan api, detektor asap, dan rencana evakuasi, meskipun telah memiliki infrastruktur keselamatan dasar. Analisis tematik mengungkap tiga hambatan utama terhadap proses sertifikasi: kompleksitas prosedur, keterbatasan kapasitas institusional, dan rendahnya kesadaran di kalangan pengelola bangunan. Temuan ini menekankan perlunya sistem sertifikasi digital yang lebih sederhana, dukungan pemerintah kota yang lebih kuat, serta sosialisasi regulasi yang lebih terarah. Studi ini berkontribusi pada literatur mengenai tata kelola keselamatan perkotaan di Indonesia dan menawarkan wawasan praktis untuk memperkuat ketangguhan terhadap risiko bencana serta kerangka kepatuhan bangunan di kota-kota Indonesia.
Kata kunci: Sertifikat Laik Fungsi, Keselamatan bangunan publik, Regulasi bangunan

A. Introduction

Rapid urban development across Indonesia has intensified the need for effective regulatory mechanisms to ensure the safety and functionality of public buildings. As cities grow denser and more complex, the risk of structural failure and fire-related hazards also increases, especially in the absence

of adequate safety certification. In response to this challenge, the Indonesian government mandates the Functional Feasibility Certificate (SLF) as a legal prerequisite for building occupancy. The SLF verifies compliance with structural, safety, health, and environmental standards and is intended to prevent unsafe buildings from being used by the public [1].

Despite this regulatory framework, SLF ownership remains alarmingly low in many Indonesian cities. Studies have reported that even large commercial and institutional buildings often operate without valid certification, leaving users vulnerable and undermining legal accountability [2, 3]. In Banda Aceh, preliminary observations suggest a similar pattern of low SLF adoption, raising questions about enforcement, institutional performance, and compliance behavior among building operators.

While prior research has explored fire safety infrastructure [2], inter-agency collaboration [3], and disaster mitigation policies [4], less attention has been given to the systemic factors that explain non-compliance with SLF regulations, particularly in secondary cities. The regulatory apparatus for SLF exists, but the effectiveness of implementation varies across regions, suggesting deeper issues related to administrative coordination, institutional capacity, and procedural complexity. Recent national-level initiatives, such as the collaboration between the National Research and Innovation Agency (BRIN) and the Indonesian Fire and Rescue Foundation (IFRF), have sought to standardize technical guidelines for fire safety to support local implementation efforts [5]. As [6, 7] argue in their respective analyses of regulatory enforcement and public infrastructure, compliance is not merely a matter of law but of institutional incentives, information dissemination, and bureaucratic functionality.

This paper contributes to the growing body of literature on regulatory governance by problematizing SLF implementation as a compliance issue shaped by institutional fragmentation, procedural burdens, and informational gaps. Drawing on frameworks from urban governance and regulatory enforcement studies [6], it examines how and why building owners fail to complete the SLF process, despite formal mandates and available infrastructure. This perspective aligns with broader urban resilience frameworks, which emphasize regulatory coherence, disaster preparedness, and institutional adaptability in secondary cities [8].

Building on this gap, this study examines the underlying reasons for low SLF adoption in public buildings in Banda Aceh, despite existing regulatory mandates, by focusing on the interplay of procedural, institutional, and technical barriers. Through a qualitative case study of four key public facilities, the research addresses how implementation failures emerge within Indonesia's decentralized regulatory environment.

B. Literature Review

Functional Feasibility Certificate (SLF) in Indonesia

The Functional Feasibility Certificate (SLF) is a mandatory document issued by local governments in Indonesia, declaring that a building has met administrative and technical requirements in accordance with its designated function. It ensures that buildings are safe, healthy, and environmentally sound prior to being occupied [1]. The legal basis for SLF in Indonesia is rooted in Law No. 28 of 2002 concerning Buildings, which was further operationalized by Regulation No. 27/PRT/M/2018.

SLF plays a crucial role in building governance and public safety. According to [9], in a study conducted in Banda Aceh, the low percentage of SLF ownership in public buildings indicates both a lack of awareness and regulatory enforcement. Only 2% of surveyed buildings had obtained SLF, despite operating as public facilities. This gap points to systemic administrative issues and insufficient policy dissemination by local authorities. Similar findings were also reported in Semarang, where SLF compliance was hampered by fragmented institutional coordination and the absence of integrated data systems [6].

The SLF system is not merely a bureaucratic requirement, but a foundational mechanism to uphold the integrity and safety of built environments. As [8] notes, SLF serves as both a technical validation and a legal acknowledgment that a building complies with national standards. Without this certificate, public buildings operate in a legal gray area, posing risks to users and diminishing accountability.

Moreover, the enforcement of SLF is often constrained by resource limitations at the municipal level. Local governments may lack trained personnel to conduct technical inspections or face pressure from developers to expedite occupancy permits [10]. This highlights the need for capacity building and standardized inspection tools across municipalities to ensure consistent implementation of SLF regulations.

Safety and Reliability in Public Buildings

Public buildings serve large and diverse populations, making safety a top priority. [11] argues that the design of public architecture must balance functionality with spatial efficiency and circulation. Modern public buildings should integrate robust fire safety systems, including sprinklers, smoke detectors, fire alarms, and emergency exits. The National Fire Protection Association (NFPA) has codified these measures under the Life Safety Code [12], which provides benchmarks widely referenced in international safety protocols.

A study by [2] revealed that in Jakarta, a considerable number of high-rise public buildings lacked essential fire safety infrastructure. Their findings suggest a disconnect between building design intentions and their implementation, often due to cost-cutting or limited regulatory oversight.

Fire safety is particularly critical in densely populated public structures. According to [13], integrating health and wellbeing into building design not only improves environmental performance but also supports occupant safety and comfort. Public buildings must prioritize redundancy in fire suppression systems and ensure emergency exits are accessible to all, including individuals with disabilities.

Challenges in SLF Implementation

Implementing SLF in Indonesian cities encounters several barriers. [3] emphasize the fragmentation of institutional responsibilities and lack of inter-agency coordination in urban fire risk management. Furthermore, political will and capacity building at the municipal level remain limited, hampering the operational effectiveness of SLF issuance and supervision.

[4] note that fire risk mitigation strategies in Jakarta are still reactive rather than preventive. They recommend integrating fire safety considerations into early design stages, enhancing community engagement, and strengthening enforcement of SLF through incentives and penalties.

One major challenge in implementing SLF policies is the disconnect between national standards and local building practices. According to [14], many building owners, particularly in smaller urban areas, remain unaware of SLF or misunderstand its requirements. This gap in knowledge undermines compliance efforts and necessitates more aggressive educational outreach by authorities.

Furthermore, political economy factors, such as corruption or informal lobbying, can interfere with proper certification procedures [11]. In some cases, SLF issuance has been expedited without full technical evaluations, compromising safety. These issues highlight the urgency of creating transparent, accountable governance structures for certification.

Comparative Perspectives on Building Certification

Comparative experiences from other countries offer valuable insights into enhancing the implementation of the Functional Feasibility Certificate (SLF) policy in Indonesia. While Indonesia has established a regulatory structure for SLF issuance, the enforcement mechanisms remain weak and fragmented [15]. In contrast, India and Malaysia implement more robust legal penalties and mandate periodic renewals, which have led to greater compliance with building safety standards [16].

In Singapore and Malaysia, the use of digital platforms has modernized the building certification process, enabling real-time document submission, automated tracking, and centralized audits. These systems improve transparency, facilitate inter-agency coordination, and reduce bureaucratic delays [17]. Indonesia could adapt similar digital governance tools to enhance the efficiency and integrity of its SLF process, especially given ongoing efforts to reform building permit regulations.

Although some digitalization exists in Indonesia's construction permit system, SLF certification procedures remain largely manual and decentralized. A centralized, interoperable digital platform could significantly reduce procedural complexity and strengthen regulatory oversight [18]. Studies also emphasize the importance of aligning digital tools with institutional reform, including public awareness campaigns and stronger legal enforcement.

These comparisons underscore a critical point: regulatory frameworks alone are not sufficient. Indonesia must also address implementation challenges, particularly in secondary cities like Banda Aceh, where institutional capacity, infrastructure, and regulatory outreach are relatively limited. Enhancing SLF effectiveness will require a combination of technical modernization, legal reform, and stakeholder engagement to ensure buildings meet the safety standards intended by the legislation.

C. Methodology

This study adopts a qualitative case study approach to explore the barriers and implementation challenges of the Functional Feasibility Certificate (SLF) in public buildings in Banda Aceh. A case study was deemed appropriate as it allows for an in-depth investigation of complex social and institutional phenomena within their real-life context, particularly when regulatory practices intersect with physical infrastructure and administrative behavior [19]. By focusing on four diverse buildings in a single city, the study provides a concentrated view of how SLF regulations are interpreted and applied (or neglected) in practice.

To assess the technical readiness of each building, the study employed a set of eight fire safety features as core observation indicators: fire extinguishers, emergency exits, fire alarms, smoke detectors, fire hydrants, evacuation plans, fire doors, and directional signage. These indicators were selected based on their mandatory inclusion in national SLF requirements as outlined in Regulation No. 27/PRT/M/2018, as well as their centrality in international fire safety standards such as [12]. They represent a balance between active and passive fire protection systems and serve as measurable proxies for determining whether a building has met minimum life-safety benchmarks. Moreover, these features are consistently referenced in building audits and are used operationally by regulatory bodies during SLF inspections.

The qualitative nature of this study allows for triangulation between observational findings, interviews, and policy documents, facilitating a deeper understanding of both material conditions and institutional dynamics. This approach also helps capture variations in stakeholder awareness, procedural experiences, and infrastructural constraints that may not be observable through quantitative surveys alone.

The SLF is regulated under Law No. 28 of 2002 concerning Buildings and operationalized through Regulation No. 27/PRT/M/2018 issued by the Ministry of Public Works and Housing [1]. It requires all buildings to obtain certification prior to occupancy to ensure that safety, health, and environmental standards are met [3]. However, prior studies have noted the gap between regulation and enforcement, particularly at the municipal level [13].

The study focused on four purposively selected buildings in Banda Aceh, chosen to represent variation in function, public access, and SLF status. The buildings included a bank headquarters, a public hospital outpatient clinic, a hotel, and a shopping mall. Selection was guided by maximum variation sampling to ensure diverse building typologies and stakeholder roles.

Table 2. Characteristics of case study buildings

No	Building name	Primary function	SLF status	Number of floors
1	BSI Landmark Building	Banking (Commercial)	Valid	8
2	RSUD dr. Zainoel Abidin (Polyclinic)	Healthcare (Public)	Not Available	3
3	Kyriad Muraya Hotel	Hospitality (Private)	Not Available	5
4	Suzuya Mall Banda Aceh	Retail and Shopping Center	Not Available	4

Table 1 presents the core characteristics of the four case study buildings selected for this research. The sample includes a mix of building functions, commercial, public service, hospitality, and retail, which allows for a comparative analysis across different institutional and operational contexts [20]. The BSI Landmark Building, serving as a financial institution, was the only facility with a valid SLF at the time of data collection. The remaining three buildings, despite their high public usage and multi-storey designs, had not obtained the SLF.

The table also reflects variation in building size, ranging from three to eight floors. These physical differences are important, as they influence fire risk exposure, complexity of evacuation planning, and technical certification requirements. The inclusion of both government and privately-managed facilities further enriches the analysis by capturing differences in administrative capacity and regulatory compliance behavior. Overall, the case selection supports the study's aim to investigate diverse barriers to SLF ownership in mid-sized urban environments like Banda Aceh.

Data for this study were collected through a combination of field observations, semi-structured interviews, and document analysis to ensure triangulation and methodological robustness [21]. Field observations were conducted at four purposively selected public buildings to assess the presence and functionality of eight key fire safety infrastructure components, as specified in national SLF guidelines. These indicators included fire extinguishers, emergency exits, fire alarms, smoke detectors, hydrants, evacuation plans, fire doors, and directional signage. Each feature was visually inspected, documented with photographs, and recorded using a structured observation checklist. In total, sixteen observational data points were compiled across the four sites.

In parallel, four semi-structured interviews were conducted with personnel responsible for managing or maintaining each building. The participants were selected based on their direct operational involvement and familiarity with SLF procedures and compliance history. The interview protocol covered four thematic areas: (1) awareness and understanding of SLF requirements, (2) administrative experience with the application or renewal process, (3) perceived challenges related to technical safety, and (4) institutional and procedural barriers to certification. All interviews were audio-recorded with consent, transcribed verbatim, and coded for thematic analysis.

To complement the field and interview data, a total of eight supporting documents were analyzed. These included national regulations, particularly Regulation No. 27/PRT/M/2018 on Building Functional Feasibility, local implementation guidelines, SLF application forms, and relevant academic publications. The document analysis served to contextualize the empirical findings within the broader legal and policy framework, and to identify regulatory gaps and inconsistencies. This multi-source approach enabled a comprehensive understanding of SLF implementation dynamics and allowed for cross-validation of findings through methodological triangulation.

The collected data were analyzed using thematic analysis to identify recurring patterns, relationships, and underlying meanings across the different data sources. The analytical process followed the six-phase framework outlined by [23], which includes: (1) familiarization with the data, (2) generating initial codes, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes, and (6) producing the report. This approach was selected due to its flexibility and suitability for exploring perceptions, experiences, and institutional practices related to regulatory compliance.

Interview transcripts were read multiple times for immersion and coded manually using both inductive and deductive strategies. Initial codes were derived from the interview questions (e.g.,

awareness, barriers, procedures), and additional codes emerged from repeated content patterns in the responses. Codes were then clustered into overarching themes representing the core barriers to SLF implementation. These themes were refined through iterative comparison and validation against observational and documentary data.

Observational checklists were analyzed descriptively, focusing on the frequency and completeness of safety features across the four buildings. Patterns of technical readiness were compared to administrative preparedness to assess congruence between infrastructure and compliance behaviors. Document analysis was used to triangulate and contextualize the findings by identifying procedural inconsistencies, gaps in regulatory communication, and institutional overlaps in implementation.

To enhance the validity of the findings, methodological triangulation was applied by cross-referencing interview statements, field observations, and document content. In addition, data saturation was achieved as no new themes emerged after the fourth interview, supporting the adequacy of the sample size for exploratory qualitative research. The analytic process was documented systematically to ensure transparency and replicability.

D. Results and Discussion

This section presents the key findings of the study in light of the research objective: to investigate why SLF ownership remains low in Banda Aceh despite regulatory mandates. Through a combination of observational data, interviews, and document review, the study reveals three core patterns: (1) uneven infrastructure compliance, (2) absence of certification despite partial technical readiness, and (3) systemic administrative barriers that impede SLF processing. These themes are explored below and situated within the broader discourse on regulatory compliance, institutional governance, and disaster risk management.

SLF Ownership and Overall Compliance

Among the four observed public buildings in Banda Aceh, only the BSI Landmark Building possessed a valid Functional Feasibility Certificate (SLF), while the remaining three, Dr. Zainoel Abidin Regional General Hospital Polyclinic, Kyriad Muraya Hotel, and Suzuya Mall, lacked certification. Although some of these facilities had implemented basic fire safety measures such as hydrants and emergency exits, the absence of SLF documentation reflects systemic regulatory non-compliance. These findings align with earlier studies indicating that SLF ownership in Banda Aceh remains below 25% among public buildings [9], suggesting limited stakeholder awareness and weak enforcement mechanisms.

More importantly, this gap underscores a broader issue in regulatory behavior: safety compliance is often treated as a physical checklist, not as a legal and procedural obligation. As one building manager stated: “We know it [SLF] is required, but honestly, no one ever checks or pushes us to get it.” It’s not something we think about unless there’s a government audit. This illustrates how low perceived risk and absent regulatory oversight contribute to the neglect of certification. Figure 1 below provides a visual summary of SLF ownership among the sampled buildings.

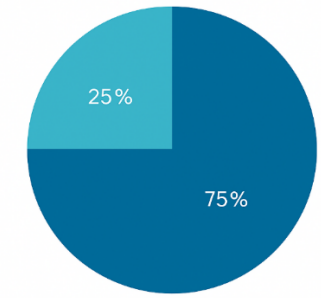

Figure 3. SLF Ownership Status Among Observed Buildings

Building Safety Infrastructure Conditions

All four buildings showed partial adherence to technical safety standards, hydrants, emergency exits, and fire extinguishers were consistently present. However, deeper analysis reveals important inconsistencies. For instance, three of the four buildings lacked smoke detectors, fire doors, or evacuation plans, which are essential for high-occupancy safety.

These gaps are not just technical oversights; they reveal a risk perception bias. Safety measures that are physically visible (like hydrants) tend to be prioritized, while procedural elements (evacuation plans, signage) are ignored. This reflects what [22] observed in hospital buildings, compliance often emphasizes appearance over substance.

Table 2 summarizes these findings and shows that even buildings with relatively complete infrastructure may still operate without an SLF. This disconnection illustrates that technical readiness alone does not lead to legal compliance, and further indicates a failure in procedural enforcement and institutional oversight.

Table 2. SLF Ownership and Building Safety Features

No	Building name	SLF status	Fire extinguisher	Emergency exit	Fire alarm	Smoke detector	Fire door	Hydrant	Evacuation plan
1	BSI Landmark Building	Available	✓	✓	✓	✓	✓	✓	✓
2	RSUD dr. Zainoel Abidin (Polyclinic)	Not Available	✓	✓	✗	✗	✗	✓	✗
3	Kyriad Muraya Hotel	Not Available	✓	✓	✓	✓	✗	✓	✗
4	Suzuya Mall Banda Aceh	Not Available	✓	✓	✗	✗	✗	✓	✗

Thematic Analysis of Administrative and Procedural Barries

The study identified several administrative and procedural barriers that hinder the effective implementation of the Functional Feasibility Certificate (SLF) in public buildings. These obstacles consistently emerged across all four case study sites and were developed into three major themes through a structured thematic analysis process: procedural complexity, institutional capacity gaps, and stakeholder awareness deficit.

Thematic coding began with open coding of interview transcripts, where initial codes such as “confusing paperwork,” “slow process,” “lack of staff,” and “not aware of SLF” were grouped into broader sub-themes. These sub-themes were then refined through iterative review and triangulated with observation data to form the three overarching themes.

Firstly, procedural complexity was cited as a major deterrent to initiating the SLF process. Building managers described the system as opaque, fragmented, and time-consuming. Required documentation was considered excessive, and the absence of a digital tracking mechanism exacerbated the perception of inefficiency. One informant remarked, “The process is long and confusing. You submit documents, then wait without updates. It’s better to operate quietly than get stuck in paperwork.” This user-unfriendly administrative environment discourages compliance even among those with basic safety infrastructure.

Secondly, institutional capacity gaps were evident at the municipal level. Local authorities often lack trained personnel to conduct technical inspections or offer procedural support to applicants. Respondents also reported receiving conflicting instructions from different agencies, reinforcing

perceptions of disorganization. These findings align with broader critiques of fire safety governance in Indonesia, where regulatory responsibilities are fragmented and poorly coordinated [3].

Thirdly, awareness deficit among building stakeholders, particularly private-sector facility managers, was pervasive. While participants acknowledged the importance of fire safety tools such as extinguishers and alarms, few were aware of the SLF's legal requirements or its renewal obligations. As one manager noted, "I thought as long as we had fire extinguishers, we were okay. I didn't know about the certificate until this interview." This underscores a critical communication gap between regulatory bodies and the operational level, pointing to the need for targeted outreach and ongoing public education.

These three interlocking themes, complex procedures, institutional weaknesses, and low awareness, were derived systematically from the coded data and are visually summarized in Figure 2 below. The figure illustrates the hierarchical structure of the themes and sub-themes that emerged from the analysis, emphasizing how these issues overlap and reinforce each other. It shows that administrative inefficiency, rather than technical inadequacy, is the dominant barrier to SLF compliance, and that overcoming it will require coordinated reform at multiple institutional levels.

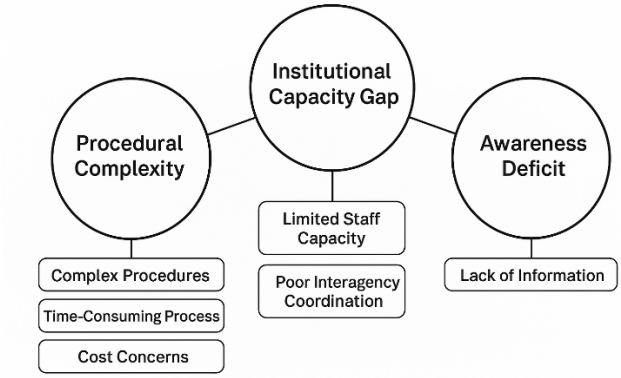

Figure 2. Emergent Themes and Sub-themes on Barriers to SLF Implementation, Developed Through Thematic Analysis of Interview and Observation Data

Legal and Disaster Governance Implications

The absence of a SLF in public buildings is not merely a technical or administrative oversight, it constitutes a significant legal and governance issue. As a legal instrument mandated by national regulation [1], the SLF validates a building's compliance with safety, health, and environmental standards prior to occupancy. Buildings operating without an SLF, particularly those serving the public, are technically in violation of Regulation No. 27/PRT/M/2018, thereby exposing owners and operators to potential legal liabilities in the event of accidents or disasters.

This regulatory non-compliance becomes particularly critical when viewed through the lens of disaster risk governance. As urban environments grow more complex and disaster-prone, institutional mechanisms that verify and enforce minimum safety standards are essential for risk reduction. The SLF, in this context, functions as a preventive governance tool, its absence increases legal exposure, undermines accountability, and ultimately erodes public trust in regulatory institutions.

Moreover, weak SLF enforcement signals broader deficiencies in governance capacity. When local governments are unable or unwilling to enforce certification, this reflects institutional fragmentation, lack of technical competence, and inadequate inter-agency coordination. The consequences extend beyond building safety: they undermine the credibility of urban management systems and signal a disconnect between formal regulation and practical implementation.

These findings directly relate to global frameworks such as the Sendai Framework for Disaster Risk Reduction 2015-2030, which calls for strengthened disaster risk governance and emphasizes the importance of risk-informed infrastructure development [24]. Indonesia, as a signatory, has committed to improving regulatory coherence and institutional accountability across all levels of

government. Ensuring consistent SLF enforcement, therefore, is not just a matter of domestic regulation, it is part of a broader international obligation to reduce disaster risk and enhance community resilience.

In this sense, the SLF should be reframed not as a bureaucratic endpoint, but as a dynamic instrument of urban resilience. When effectively enforced, it acts as a gatekeeper that filters unsafe, incomplete, or noncompliant structures before they become operational liabilities. Integrating SLF compliance into broader disaster preparedness, audit, and urban planning strategies could significantly enhance Indonesia's ability to mitigate risk and respond to emergencies.

Comparative Analysis and Best Practice Synthesis

The analysis of SLF implementation in Banda Aceh gains further depth when viewed alongside international experiences, particularly from countries such as Malaysia, India, and Singapore. These countries have successfully institutionalized building certification systems through the integration of digital platforms, structured inspection cycles, and enforceable legal mechanisms. For example, in Malaysia, digital SLF application portals have enabled real-time monitoring, document validation, and automated scheduling of inspections, significantly reducing procedural delays [16]. India enforces SLF renewals periodically, supported by strong legal sanctions for non-compliance, while Singapore's Building and Construction Authority (BCA) has implemented a centralized digital system that streamlines building permit and compliance processes through a single dashboard [17].

These international experiences point to several key strategies that Indonesia could adopt. First, the implementation of a national-level digital SLF platform would increase transparency, reduce redundancy, and provide applicants with real-time feedback. Second, aligning SLF with existing building permit renewal mechanisms could encourage more consistent compliance. Third, the use of data-driven inspection scheduling, combined with risk-based prioritization, could help optimize resource allocation at the municipal level. These elements together represent a best-practice model that links technical readiness with institutional responsiveness.

Synthesizing lessons from these comparative cases reveals a critical insight: compliance improves when certification systems are not only legally mandated but also digitally accessible, procedurally predictable, and institutionally supported. Embedding SLF within broader urban governance and resilience strategies, rather than treating it as a standalone administrative requirement, may significantly strengthen its implementation in Indonesia.

Cross-Case Analysis: Infrastructure and Administrative Readiness

To further illuminate the dynamics of SLF implementation across the observed cases, this study constructs a cross-case matrix comparing infrastructure readiness and administrative preparedness. Infrastructure readiness refers to the physical availability and functionality of eight safety features as specified in SLF guidelines, such as fire alarms, evacuation plans, hydrants, and fire doors. Administrative preparedness, on the other hand, considers factors such as SLF documentation, knowledge of procedures, and engagement with the certification process.

By juxtaposing these two dimensions, the matrix reveals critical gaps between technical compliance and institutional execution. For instance, while the BSI Landmark Building demonstrates both high infrastructure and administrative readiness, other buildings show partial technical compliance but lack engagement with the SLF process. This indicates that technical capability does not automatically translate into regulatory adherence. The matrix serves as an analytical tool to identify where interventions, whether procedural, informational, or policy-driven, are most needed to close the compliance gap.

Table 3. Cross-case Matrix of Infrastructure and Administrative Readiness Among the Four Case Study Buildings

No	Building name	SLF status	Safety Infrastructure Score (out of 8)	Administrative Preparedness
1	BSI Landmark Building	Available	8	High
2	RSUD dr. Zainoel Abidin (Polyclinic)	Not Available	4	Low
3	Kyriad Muraya Hotel	Not Available	5	Medium
4	Suzuya Mall Banda Aceh	Not Available	5	Low

Table 3 presents a comparative view of each building's physical safety readiness against its administrative preparedness related to SLF certification. The data demonstrate that even when basic safety infrastructure is present, as seen in Kyriad Muraya Hotel and Suzuya Mall, administrative engagement with SLF procedures remains limited. This underscores the core insight of the study: technical compliance alone does not guarantee regulatory adherence. The findings highlight the multidimensional nature of SLF implementation, where infrastructure adequacy must be accompanied by institutional capacity, procedural clarity, and policy enforcement.

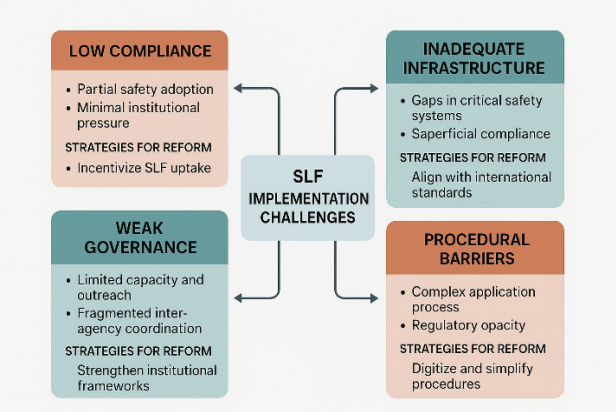

Figure 3. SLF Implementation Challenges and Strategies for Reform

To better understand these intersecting dimensions, Figure 3 synthesizes the emergent themes from the field data into a conceptual framework. This framework outlines the critical implementation challenges, such as procedural complexity, fragmented institutional responsibilities, and awareness gaps, and links them to actionable strategies drawn from both local and international best practices. Together, the matrix (Table 3) and the framework (Figure 3) provide a comprehensive lens for analyzing SLF performance and designing targeted policy interventions.

Discussion

The findings of this study offer a deeper understanding of the persistent gap between regulatory mandates and compliance behavior in the context of Functional Feasibility Certificate (SLF) implementation in Banda Aceh. Aligning with the study's objective to examine institutional, technical, and procedural barriers, the results reveal that regulatory instruments such as SLF remain underutilized, with only one of the four observed buildings possessing a valid certificate. This confirms earlier studies [8] and suggests that legal mandates alone are insufficient to ensure enforcement without adequate institutional pressure and support mechanisms.

While all buildings had installed some form of fire protection infrastructure, such as extinguishers, hydrants, and emergency exits, there were notable deficiencies in critical components such as fire alarms, evacuation signage, and fire doors. These inconsistencies echo previous findings [2], which highlight the frequent disparity between design standards and field implementation. Importantly, the decision to install only the most visible or easily managed systems suggests a

symbolic compliance mindset, wherein managers fulfill surface-level safety expectations but neglect deeper structural requirements. This behavior can be explained using regulatory compliance theory, which distinguishes between instrumental compliance (motivated by avoiding penalties) and normative compliance (motivated by shared safety values) [6].

Several interviews revealed that procedural complexity and regulatory opacity were major deterrents to SLF application. One building manager expressed, "The process is long and confusing. You submit documents, then wait without updates. It's better to operate quietly than get stuck in paperwork". This illustrates the impact of institutional inefficiency on compliance decisions, especially when administrative systems are perceived as burdensome rather than supportive. The lack of clarity around SLF procedures, combined with minimal outreach by local authorities, contributes to what [6] describes as compliance fatigue, where actors disengage from formal processes due to high perceived transaction costs.

Furthermore, weak inter-agency coordination and low institutional capacity exacerbate the problem. Without trained personnel, standardized inspection tools, or consistent enforcement routines, local governments struggle to implement SLF as a governance tool rather than a bureaucratic formality. These findings align with [3], who argue that fragmented authority and unclear mandates are critical bottlenecks in Indonesia's fire risk governance.

The legal and operational implications of these shortcomings are significant. Operating a public building without SLF not only violates national law [1], but also exposes operators to liability and reputational risk in the event of emergencies. Moreover, the absence of certification undercuts broader public safety objectives and contradicts Indonesia's commitments under global frameworks such as the Sendai Framework for Disaster Risk Reduction [24], which stresses the importance of risk-informed infrastructure governance and legal accountability mechanisms in disaster-prone urban environments.

Finally, this study identifies actionable strategies to improve SLF uptake. These include simplifying application workflows, introducing automated digital certification systems, and expanding public awareness campaigns. Incentive-based approaches, such as linking SLF to utility discounts or fast-tracked business permits, could shift compliance from being purely instrumental to more intrinsic. International comparisons also offer models worth adapting. Malaysia and India, for instance, have enforced stronger penalties for non-compliance and tied SLF validity to automatic renewal intervals and digital inspection tracking [16]. These mechanisms provide not only deterrents but also structured incentives for long-term compliance.

SLF implementation in Banda Aceh reflects the intersection of technical adequacy, institutional limitations, and behavioral governance. Improving compliance will require addressing both the visible and invisible dimensions of the regulatory environment: from infrastructure gaps and legal ambiguities to managerial attitudes and institutional cultures.

E. Conclusion

This study investigated the implementation of the Functional Feasibility Certificate (SLF) in public buildings across Banda Aceh, revealing substantial gaps between regulatory mandates and practical compliance. Only one of the four buildings examined possessed a valid SLF, while others, despite having partial safety infrastructure, lacked legal certification and procedural engagement. These findings highlight that the challenge of SLF implementation lies not only in technical readiness but in administrative fragmentation, procedural opacity, and a general lack of awareness among building operators. By situating this case within the broader context of regulatory compliance literature, the study contributes theoretically by showing how institutional capacity and informational asymmetry shape policy effectiveness in decentralized urban settings.

From a policy perspective, the study underlines the need for multi-level interventions to strengthen the SLF framework in secondary cities. Short-term reforms should focus on developing a digital application portal, enhancing clarity in certification procedures, and improving technical

training for local government staff. Medium-term strategies could include integrating SLF compliance into building permit renewals, establishing municipal coordination units, and providing fiscal or procedural incentives for early adopters. In the long term, SLF should be embedded into broader national risk governance systems, including mandatory re-certification tied to risk-based inspection models and disaster resilience indicators. These layered reforms, if adopted systematically, would transform SLF from a symbolic regulatory instrument into an active mechanism for protecting urban populations.

Beyond the immediate policy implications, the findings offer practical insights that can inform building regulation practices in other Indonesian cities and Southeast Asian contexts facing similar urban governance constraints. The identification of administrative bottlenecks and behavioral deterrents can serve as a foundation for developing scalable and adaptable compliance frameworks. As a practical contribution, the study also proposes a simplified SLF self-assessment checklist (Appendix A) to assist building managers in evaluating their readiness and identifying compliance gaps.

However, this study is not without limitations. The analysis was limited to four buildings in Banda Aceh and employed a qualitative methodology, which, while rich in detail, restricts generalizability. Future research should consider broader cross-regional studies, combining quantitative surveys with participatory stakeholder analysis, to deepen understanding of compliance behavior across different institutional and cultural contexts. In addition, further exploration is needed on how digital governance innovations, such as integrated permitting systems and automated inspection scheduling, influence compliance in practice. By extending the scope of inquiry, future work can help shape a more resilient, accountable, and responsive building regulation system in Indonesia and beyond.

Acknowledgement

The authors would like to thank the Department of Public Works and Spatial Planning of Banda Aceh and the Building Management Teams of BSI Landmark, Dr. Zainoel Abidin Regional General Hospital, Kyriad Muraya Hotel, and Suzuya Mall for their cooperation and valuable contributions during the field observations and interviews.

References

[1] Ministry of Public Works and Housing, “Regulation No. 27/PRT/M/2018 on Building Functional Feasibility Certificates,” Jakarta: Government of Indonesia, 2018.

[2] H. A. Rahardjo and M. Prihanton, “The most critical issues and challenges of fire safety for building sustainability in Jakarta,” *Journal of Building Engineering*, vol. 29, no. 101133, 2020. https://doi.org/10.1016/j.jobe.2019.101133

[3] A. Harakan, Y. A. Hilman, A. J. Karso, A. Awaluddin, N. Nurhalijah, I. S. Muin, A. Nurdiansyah, A. Fadillah, and R. Hardi, “Inter-agency collaboration in building urban fire resilience in Indonesia: How do metropolitan cities address it?,” *Frontiers in Sustainable Cities*, vol. 7, no. 1492869, 2025. https://doi.org/10.3389/frsc.2025.1492869

[4] T. Taufiqurokhman, E. Satispi, H. Trustisari, and G. Supangkat, “Urban fire disaster mitigation policy (Case study of fires in the city of Jakarta),” *Jurnal Cahaya Mandalika*, vol. 3, no. 3, p. 2164-2177, 2024. Retrieved from https://ojs.cahayamandalika.com/index.php/jcm/article/view/3102

[5] IFRF, “BRIN and IFRF join forces to set new fire safety standards. Indonesian Fire and Rescue Foundation,” 2024. Retrieved from https://ifrf-official.org/brin-and-ifrf-join-forces-to-set-new-fire-safety-standards/

[6] T. L. Marina, “Evaluasi penerapan sertifikat laik fungsi sebagai instrumen tata kelola bangunan di Kota Semarang,” *Jurnal Riptek*, vol. 18, no. 2, p. 119-130, 2024. https://riptek.semarangkota.go.id/index.php/riptek/issue/view/21/showToc

[7] R. Batra, "A thematic analysis to identify barriers, gaps, and challenges for the implementation of public-private-partnerships in housing," *Habitat International*, vol. 118, no. 102454, 2021. https://doi.org/10.1016/j.habitatint.2021.102454
[8] M. Fuady, M. Buraida, M. A. Kevin, M. R. Farrel, and A. Triaputri, "Enhancing urban resilience: Opportunities and challenges in adapting to natural disasters in Indonesian cities," *Sustainability*, vol. 17, no. 4, p. 1632, 2025. https://doi.org/10.3390/su17041632
[9] H. A. Rani and M. Hanif, "Penerapan Sertifikasi Laik Fungsi terhadap Bangunan Publik di Kota Banda Aceh," *Jurnal Tameh*, vol. 10, no. 1, p. 9-19, 2021. https://doi.org/10.37598/tameh.v10i1.120
[10] F. Hardaningrum, R. E. Wibisono, dan T. Ilhamzah, "Analisis pelaksanaan penerbitan Sertifikat Laik Fungsi (SLF) bangunan gedung di Kota Surabaya dengan metode statistika deskriptif," *Publikasi Riset Orientasi Teknik Sipil (PROTEKSI)*, vol. 6, no. 2, p. 127-133, 2024. https://doi.org/10.26740/proteksi.v6n2.p127-133
[11] S. Rini, "Applying Indonesia regulation on fire protection system at WTC 1 building in Jakarta through fire risk assessment (FRA)," *E3S Web of Conferences*, vol. 388, no. 01033, 2023. https://doi.org/10.1051/e3sconf/202338801033
[12] National Fire Protection Association (NFPA), *NFPA 101: Life Safety Code*. Quincy, MA: NFPA, 2021.
[13] D. Heriyusman, "Pemetaan faktor-faktor pengaruh sertifikat laik fungsi bangunan gedung: Pendekatan gap analysis," *Jurnal Sains dan Teknologi ISTP*, vol. 15, no. 02, p. 154-167, 2021. https://doi.org/10.59637/jsti.v15i2
[14] D. Elora, "Sertifikat laik fungsi pada bangunan gedung di Kota Bandung dalam kaitannya dengan izin mendirikan bangunan," *Jurnal Ilmiah Universitas Batanghari Jambi*, vol 21, no. 3, p. 963-968, 2021. http://dx.doi.org/10.33087/jiubj.v21i3.1687
[15] F. Hardaningrum, R. E. Wibisono, dan T. Ilhamzah, "Analisis pelaksanaan penerbitan Sertifikat Laik Fungsi (SLF) bangunan gedung di Kota Surabaya dengan metode statistika deskriptif," *Publikasi Riset Orientasi Teknik Sipil (PROTEKSI)*, vol. 6, no. 2, p. 127–133, 2024. https://doi.org/10.26740/proteksi.v6n2.p127-133
[16] F. Khudzari, R. A. Rahman, and S. K. Ayer, "Factors affecting the adoption of emerging technologies in the Malaysian construction industry," IOP Conf. Series: Earth and Environmental Science 641, 012006, 2021. https://doi.org/10.1088/1755-1315/641/1/012006
[17] Asian Development Bank, *Digital Platforms for Development: Fostering Innovation and Inclusion in Asia and the Pacific*. Manila: ADB, 2023. Available: https://www.adb.org/what-we-do/topics/digital-technology
[18] E. I. Daniel, O. S. Oshodi, N. I. Nwankwo, F. A. Emuze, and E. Chinyio, "The use of digital technologies in construction safety: A systematic review," *Buildings*, vol. 15, no. 8, p. 1386, 2025. https://doi.org/10.3390/buildings15081386
[19] R. K. Yin, *Case Study Research and Applications: Design and Methods*, 6th ed. Thousand Oaks, CA: Sage, 2018.
[20] R. B. Bouncken, W. Czakon, and F. Schmitt, "Purposeful sampling and saturation in qualitative research methodologies: Recommendations and review," *Review of Managerial Sciences*, vol. 4, no. 1, p. 55-64, 2025. https://doi.org/10.1007/s11846-025-00881-2
[21] H. A. Rani and N. Arlianti, *Dasar-Dasar Statistika dan Probabilitas dalam Ilmu Sains,* Yogyakarta: Deepublish, 2024.
[22] N. Churniadita, C. Windiyaningsih, dan S. Supardjo, "Evaluasi pemenuhan persyaratan sertifikat laik fungsi Gedung Rumah Sakit Palang Merah Indonesia tahun 2023," *Jurnal Manajemen dan Administrasi Rumah Sakit Indonesia (MARSI)*, vol. 7, no. 3, p. 248-255, 2023. https://doi.org/10.52643/marsi.v7i3.3386
[23] V. Braun and V. Clarke, "Using thematic analysis in psychology," *Qualitative Research in Psychology*, vol. 3, no. 2, pp. 77–101, 2006. https://doi.org/10.1191/1478088706qp063oa

[24] United Nations Office for Disaster Risk Reduction (UNDRR), *Sendai Framework for Disaster Risk Reduction 2015–2030*, Geneva, 2015. Available: https://www.undrr.org/publication/sendai-framework-disaster-risk-reduction-2015-2030