



Urban Building Safety Through Public Participation and Digital Governance in Indonesia

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ABSTRACT

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Ensuring operational building safety through certification is critical for sustainable urban development in Indonesia. This study examines how public participation and digital governance, through the SIMBG platform, influence SLF certification compliance. Using a concurrent mixed-method approach across Bandung, Semarang, and Sidoarjo, data were collected from 300 survey respondents and focus group discussions with stakeholders. Results show public participation significantly drives SIMBG adoption, which in turn improves SLF certification rates. Communication plays a supporting but less impactful role. Key barriers include low digital literacy, inconsistent communication, and trust issues with digital platforms. This study proposes a comprehensive model integrating public engagement with digital governance to strengthen urban safety policies. The findings offer practical insights for policymakers to enhance certification compliance through targeted public campaigns, improved communication strategies, and digital literacy programs.

1. INTRODUCTION

Building certification plays a vital role in ensuring public safety, legal compliance, and the sustainability of urban development. In Indonesia, the Sertifikat Laik Fungsi (SLF) is a mandatory certification established by Government Regulation No. 16/2021, requiring buildings to be certified as safe before use. However, the adoption rate of SLF certification remains low, with significant implications for urban risk management and sustainable city planning [1, 2].

Several studies have identified barriers to the effective implementation of SLF certification, including bureaucratic inefficiencies, insufficient public awareness, and a lack of coordination among government agencies and private stakeholders [3]. To address these challenges, the Indonesian government introduced the Sistem Informasi Manajemen Bangunan Gedung (SIMBG) digital platform, intended to streamline the certification process and enhance public accessibility [4]. These findings echo broader global discussions on building certification, where effective communication, stakeholder collaboration, and the use of digital tools have been highlighted as crucial elements for improving compliance [5].

Despite the urgency of SLF implementation, the percentage of certified buildings remains low in many cities. According to data from the Indonesian Ministry of Public Works and Housing (PUPR), this lack of compliance is attributed to

limited public awareness and inadequate coordination between government bodies and private sector stakeholders [1]. Additionally, while the government has introduced the Sistem Informasi Manajemen Bangunan Gedung (SIMBG) as a digital platform to streamline the SLF certification process, the adoption of this system has been inconsistent, particularly among small and medium-sized enterprises (SMEs) [5].

Government Regulation No. 16/2021 mandates that all operational buildings obtain SLF certification to ensure structural safety and legal compliance. However, compliance remains low due to bureaucratic complexity and limited public understanding. Existing studies lack integrated models that examine the joint effect of public participation and digital platform adoption on building safety certification in the Indonesian context. This study addresses this gap by proposing a comprehensive framework combining these dimensions.

Existing studies have proposed several solutions to improve the SLF certification process. For example, Afiah [5] suggested that digital integration through platforms like SIMBG could enhance compliance by making the application process more accessible and reducing bureaucratic delays. Furthermore, empowering local government officials and private consultants to actively promote SLF compliance among building owners is seen as a potential way to increase adoption rates [4]. However, these solutions often focus on administrative improvements rather than addressing the broader issue of public participation. There is a notable lack of

empirical models that account for varying degrees of stakeholder involvement across different cities with diverse economic activities and levels of development.

The digital divide, particularly between urban and rural areas, further complicates the adoption of platforms like SIMBG. Without targeted public engagement strategies, the platform's effectiveness may remain limited, particularly in areas with lower digital literacy and access to technology. Therefore, a more holistic model is needed—one that integrates public participation as a core component of the SLF certification process [5].

This study aims to fill the gap in the existing literature by developing a comprehensive model of public participation in SLF certification across three major Indonesian cities: Bandung, Semarang, and Sidoarjo. The study employs a mixed-method approach, combining quantitative analysis through SmartPLS and qualitative insights from Focus Group Discussions (FGDs) with stakeholders such as local government officials, the Indonesian Chamber of Commerce (KADIN), and industry associations.

The primary objective of this study is to identify key factors influencing public participation in SLF certification and to propose a model that can be adopted across different urban contexts in Indonesia. Specifically, the study will: 1. Analyze the current levels of public participation in SLF certification using a structural equation model (SEM); 2. Identify barriers to SLF certification, particularly those related to public awareness and digital adoption; 3. Propose a model of public participation that incorporates feedback from local government, industry representatives, and building owners.

The novelty of this research lies in its integrative approach to SLF certification, combining digital tools (SIMBG) with stakeholder engagement strategies to create a model that addresses both administrative inefficiencies and public engagement. The findings will contribute to policy development, particularly in enhancing public participation in building safety regulations, and offer practical recommendations for improving SLF certification across Indonesia.

This study is conducted across three cities—Bandung, Semarang, and Sidoarjo—which were selected for their varying levels of economic activity and building development. By focusing on these cities, the research aims to capture a broad spectrum of public participation patterns and regulatory challenges. The mixed-method approach ensures that both quantitative data (from survey responses) and qualitative data (from FGDs) are incorporated into the model, providing a comprehensive understanding of the SLF certification landscape in Indonesia.

2. LITERATURE REVIEW

2.1 Public participation in building certification

Public participation is increasingly recognized as a vital element in effective governance, particularly in the realms of urban planning and infrastructure development. In the context of building operability, public participation plays a crucial role in ensuring compliance with safety regulations and legal frameworks, such as the Sertifikat Laik Fungsi (SLF) in Indonesia. Research indicates that public engagement enhances transparency and accountability within the certification process, which is essential for maintaining

building safety standards, especially in sectors like tourism where certification directly affects business operations [6]. However, challenges persist, as studies have shown that a lack of public awareness and perceived bureaucratic complexities often hinder active participation in the SLF certification process [7].

In Indonesia, the introduction of digital platforms like the Sistem Informasi Manajemen Bangunan Gedung (SIMBG) has been suggested as a means to facilitate greater public involvement by simplifying the certification process [8]. Despite these advancements, public participation in SLF certification remains low, particularly in urban areas characterized by complex bureaucratic structures. This suggests that merely providing digital access is insufficient; effective engagement strategies must also address public concerns and promote awareness [9]. Therefore, the first hypothesis posits that public participation positively impacts the adoption of SIMBG in SLF certification.

Hypothesis 1 (H1): Public participation has a positive and significant impact on the adoption of SIMBG in SLF certification.

2.2 Communication in the SLF certification process

Effective communication among stakeholders is critical for the successful implementation of building certification processes. Literature highlights that communication is essential for fostering public understanding of regulatory requirements and clarifying building owners' obligations [10]. Poor communication between government agencies and building owners has been identified as a significant barrier to SLF certification, particularly in regions where public awareness is low [11, 12]. Furthermore, the need for clear and consistent communication channels between local governments and building owners is emphasized to prevent misunderstandings that could delay the certification process [13].

While the adoption of digital platforms like SIMBG is seen as a potential solution to enhance communication efficiency, studies suggest that digital tools alone cannot bridge the gap without proactive engagement efforts [14]. This leads to the second hypothesis, which asserts that communication positively affects the adoption of SIMBG in the SLF certification process.

Hypothesis 2 (H2): Communication positively affects the adoption of SIMBG in the SLF certification process.

2.3 SIMBG: A digital tool for building certification

The SIMBG platform was introduced to streamline the building certification process in Indonesia, allowing for online applications for SLF certification. This digital tool aims to address bureaucratic inefficiencies and improve public access to certification services [15]. Research indicates that SIMBG enhances transparency and reduces the time required for SLF certification. However, its success is contingent upon user adoption, which is influenced by factors such as public participation and effective communication [16]. Although initial studies suggest that SIMBG could simplify the SLF certification process, barriers related to digital literacy and access in certain regions have limited its widespread adoption [17].

In addition to addressing bureaucratic delays, SIMBG is designed to support the implementation of Government

Regulation No. 16/2021, which mandates SLF certification as a prerequisite for building operations. The platform facilitates more efficient licensing and supervision of building permits, significantly reducing procedural complexity [18]. Moreover, SIMBG plays an important role in ensuring compliance, particularly in critical sectors such as healthcare facilities [19]. Understanding and adherence to SLF regulations reflect both legal obligations and professional ethics within the construction sector [20]. These findings illustrate that in Indonesia, the integration of SIMBG with public participation strategies is essential not only for legal compliance but also for promoting sustainable urban safety governance.

Thus, the third hypothesis posits that the adoption of SIMBG mediates the relationship between public participation, communication, and the successful issuance of SLF certification.

Hypothesis 3 (H3): The adoption of SIMBG mediates the relationship between public participation, communication, and the successful issuance of SLF certification.

2.4 SLF certification and building ownership

The SLF serves as a crucial legal document certifying that building real estate, where building safety is directly linked to business sustainability [21]. However, the percentage of buildings with SLF certification remains low, especially in regions like Bandung, Semarang, and Sidoarjo, where many business owners either lack awareness of the requirement or perceive the certification process as overly complex [22]. Research suggests that simplifying the SLF certification process through digital tools like SIMBG could significantly improve compliance rates [23]. Additionally, the role of public participation and communication in promoting SLF certification has been highlighted, indicating that enhancing these factors could increase the percentage of buildings with SLF certification. Consequently, the fourth hypothesis posits that the adoption of SIMBG has a positive and significant impact on the successful issuance of SLF certification.

Hypothesis 4 (H4): The adoption of SIMBG has a positive and significant impact on the successful issuance of SLF certification.

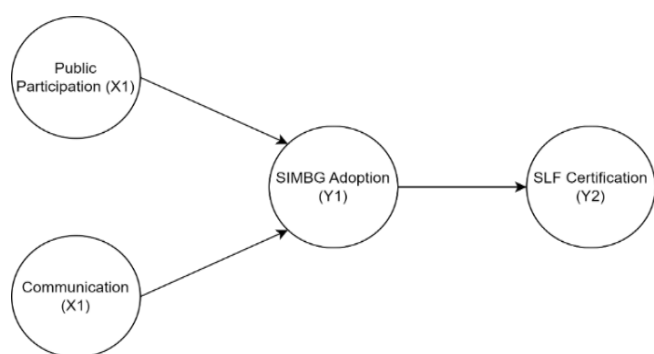


Figure 1. Research model

Figure 1 shows the conceptual research model developed in this study to examine the relationships between public participation, communication, SIMBG adoption, and SLF certification. The model posits that public participation and communication (X1) serve as exogenous variables influencing the adoption of the SIMBG platform (Y1), which in turn mediates their effect on SLF certification (Y2). The direct paths from public participation and communication to SIMBG

adoption reflect the hypothesis that higher engagement and better information exchange enhance digital platform utilization. Meanwhile, the final path from SIMBG adoption to SLF certification represents the assumption that effective use of the digital system facilitates higher compliance with SLF requirements. This model integrates both social (participation and communication) and technological (digital adoption) dimensions, aiming to provide a comprehensive understanding of the factors driving building safety certification in Indonesia.

3. METHODOLOGY

This study employs a mixed-method concurrent design, integrating both quantitative and qualitative approaches to comprehensively explore the factors influencing public participation in the certification of building operability through the Sertifikat Laik Fungsi (SLF) in Indonesia. The quantitative component involved surveys distributed to building owners and stakeholders across three cities: Bandung, Semarang, and Sidoarjo, while the qualitative component consisted of Focus Group Discussions (FGDs) with key stakeholders such as local government representatives, the Indonesian Chamber of Commerce (KADIN), and industry associations. This concurrent method allowed for the simultaneous collection of both types of data, providing a comprehensive understanding of the research problem [24].

The study was conducted in three major cities in Indonesia: Bandung (West Java), Semarang (Central Java), and Sidoarjo (East Java). These cities were chosen due to their varied economic activities, levels of urban development, and the prevalence of non-compliance with SLF certification. The cities represent distinct urban contexts, allowing the study to capture a broad spectrum of public participation patterns.

The quantitative survey involved 300 respondents, with 100 respondents from each city. Respondents included building owners, managers, or representatives responsible for applying for or managing the SLF certification for their buildings. The sample was designed to represent building owners across commercial, residential, and mixed-use sectors to ensure diverse perspectives on certification challenges. Stratified random sampling ensured adequate representation from each city and building type, enhancing generalizability within urban Indonesian contexts [25].

In addition to the survey, FGDs were conducted in each city. The FGD participants were selected to represent a variety of stakeholders: Business Representatives from KADIN (Indonesian Chamber of Commerce); Industry Associations relevant to building and construction; and Government Agencies, including representatives from the Public Works Department (PU) and the Department of Investment and Integrated Services (DPMPTSP). Each FGD included approximately 10-12 participants, and discussions were structured around themes of public participation, communication strategies, and the use of the Sistem Informasi Manajemen Bangunan Gedung (SIMBG) for SLF certification. All FGDs were recorded with participants' consent, and detailed transcripts were prepared for thematic analysis.

The quantitative survey aimed to evaluate the extent of public participation and the efficacy of communication in the SLF certification process. The survey instrument was structured as a questionnaire consisting of 18 closed-ended questions designed to measure several key variables. Public

participation (X1) was assessed through questions related to respondents' awareness of the SLF process, their involvement in obtaining certification, and their interactions with local authorities. The communication (X2) variable focused on gauging the clarity, accessibility, and overall effectiveness of information provided by authorities regarding SLF certification. Additionally, the adoption of the Sistem Informasi Manajemen Bangunan Gedung (SIMBG) (Y1) was measured by asking respondents about their perceptions of the platform's ease of use, frequency of use, and perceived usefulness in facilitating the SLF certification process. Finally, SLF certification (Y2) itself was evaluated by assessing the current certification status of the respondents' buildings and identifying any barriers encountered in obtaining certification.

Responses were captured using a Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), allowing for a standardized assessment of participants' attitudes and experiences. To ensure confidentiality and maintain ethical research practices, all responses were anonymized [26]. This structured approach facilitated a comprehensive understanding of the factors influencing public participation and communication in the SLF certification process, alongside the adoption of digital tools like SIMBG.

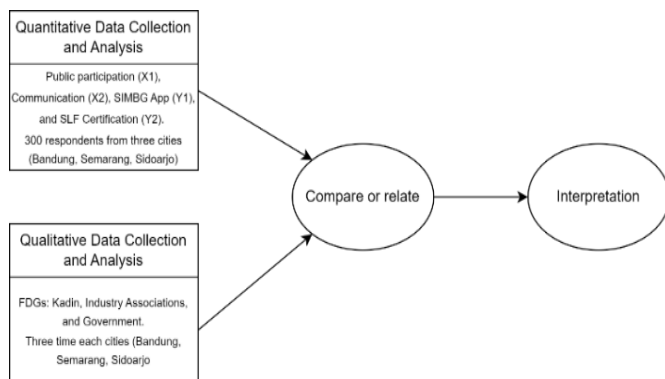


Figure 2. Research framework

The research framework shown above integrates quantitative and qualitative approaches within a concurrent mixed-method design in Figure 2. In the quantitative component, surveys were conducted to measure public participation (X1), communication (X2), SIMBG adoption (Y1), and SLF certification (Y2) among 300 respondents from Bandung, Semarang, and Sidoarjo. The qualitative component involved Focus Group Discussions (FGDs) with stakeholders from KADIN, industry associations, and local government agencies, conducted three times in each city. These two data streams were compared and related to produce a comprehensive interpretation, ensuring that both statistical relationships and detailed stakeholder insights are incorporated. This integrative approach provides a robust basis for policy recommendations aimed at strengthening urban building safety through enhanced public participation and digital governance strategies.

3.1 Qualitative Focus Group Discussions

The FGDs were designed to complement the survey data by gathering in-depth insights into the challenges and opportunities related to SLF certification. FGDs were conducted in August–September 2024 and lasted between 120–150 minutes each. The discussions were moderated by

experienced facilitators and followed a semi-structured guide with open-ended questions centered around: The effectiveness of the current SLF certification processes. The role of public participation and communication in SLF adoption; Barriers faced by different stakeholders in adopting the SIMBG platform; Suggestions for improving public participation and compliance with SLF certification. The FGDs were recorded with the participants' consent, and detailed transcripts were prepared for analysis.

3.2 Quantitative data analysis

The quantitative data collected from the surveys were analyzed using Structural Equation Modeling (SEM) with SmartPLS software, focusing on the relationships between the latent variables: public participation (X1), communication (X2), SIMBG adoption (Y1), and SLF certification (Y2). The analysis began with the measurement model assessment, where the reliability and validity of the constructs were evaluated using Cronbach's alpha, composite reliability (CR), and average variance extracted (AVE). During this process, any variables with an outer loading below 0.6 [27].

Next, the structural model assessment was performed to examine the strength and significance of the relationships between the latent variables. This was done by analyzing the path coefficients, which represent the strength of the relationships, and using bootstrapping with 5000 resamples to test the significance of the paths. All tests were conducted at a 0.05 level of significance, ensuring that the findings were statistically robust [24].

A mediation analysis was also conducted to assess the role of SIMBG adoption (Y1) as a mediator between public participation, communication, and SLF certification. This analysis used the indirect effect approach to explore whether SIMBG adoption influenced the strength of the relationships between the independent and dependent variables.

The model's overall performance was evaluated by examining the R-squared values, indicating the explanatory power of the independent variables—public participation and communication—in predicting the dependent variables, specifically SIMBG adoption and SLF certification. This comprehensive analysis provided a clear understanding of the factors that significantly impact SLF certification and digital platform adoption.

3.3 Qualitative data analysis

The FGD transcripts were analyzed using a thematic analysis approach, guided by Miles and Huberman's framework for qualitative data analysis. The following steps were conducted: (1) Data Familiarization: The transcripts were read multiple times to identify key themes related to public participation, communication, and SIMBG adoption; (2) Coding: The data were coded into meaningful categories that aligned with the survey findings, such as barriers to SLF certification, challenges in SIMBG use, and communication gaps; (3) Theme Development: Key themes were developed based on the frequency and depth of discussion in the FGDs. Themes such as "lack of public awareness," "bureaucratic challenges," and "digital adoption difficulties" were identified as significant barriers to SLF certification. The qualitative findings were then integrated with the quantitative results to provide a comprehensive understanding of the research problem [28].

4. RESULTS

4.1 Quantitative results: Structural equation modeling (SEM)

The analysis using SmartPLS confirmed the significant impact of public participation and communication on the adoption of the Sistem Informasi Manajemen Bangunan Gedung (SIMBG) in Figure 3, which in turn positively influenced SLF certification. Key results from the SEM analysis include: Public Participation (X1) had a strong positive effect on SIMBG adoption (Y1), with a path coefficient of 0.766, confirming H1. This suggests that higher levels of public involvement significantly enhance the likelihood of using the SIMBG platform. Communication (X2) had a positive and significant impact on SIMBG adoption (Y1), with a path coefficient of 0.562, supporting H2. While effective communication from government bodies is important, its effect was less pronounced than that of public participation. SIMBG adoption (Y1) had a direct positive effect on SLF certification (Y2), with a path coefficient of 0.712, validating H4. This demonstrates that greater use of the SIMBG platform is associated with a higher likelihood of obtaining SLF certification. Mediation Analysis: The results confirmed that SIMBG adoption mediates the relationship between public participation, communication, and SLF certification. The indirect effect of public participation and communication on SLF certification via SIMBG adoption was significant, supporting H3. These results highlight that public engagement plays a critical role in promoting the adoption of digital platforms like SIMBG, which in turn facilitates regulatory compliance, including SLF certification.

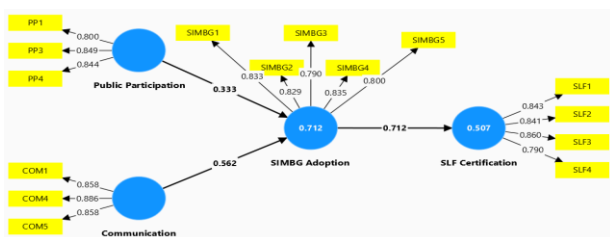


Figure 3. SmartPLS result

4.2 Qualitative results: Focus Group Discussions (FGDs)

The Focus Group Discussions (FGDs) held in Bandung, Semarang, and Sidoarjo provided valuable qualitative insights into the barriers and enablers of SLF certification. These discussions involved stakeholders such as government officials, business representatives from KADIN, and members of local industry associations. In Bandung, participants identified a significant lack of awareness regarding SLF certification requirements. Many building owners were unaware of the necessity or benefits of obtaining an SLF, with one official stating, "The majority of building owners only apply for SLF when it's needed for operational permits, not out of awareness of safety regulations." This highlights a critical gap in public knowledge about SLF compliance. Additionally, barriers related to SIMBG usage were discussed. Although the system was operational, limited digital literacy, particularly among smaller business owners, hindered its adoption. A KADIN representative noted, "Even though the system is in place, the lack of understanding about how to use it efficiently hinders its adoption."

In Semarang, the FGDs revealed communication gaps as a primary concern. Business owners mentioned that they frequently received inconsistent or unclear information from local authorities, making it difficult to stay updated on SLF requirements. A KADIN member explained, "Sometimes the rules change, but we don't get clear updates. It's hard to keep up with what's needed for SLF." Moreover, local officials identified coordination issues between the DPMPTSP and the Public Works Department (PU), which led to delays in SLF processing. These findings indicate systemic inefficiencies that further complicate the certification process.

In Sidoarjo, there was noticeable resistance to digitalization. Many participants, especially older or less tech-savvy business owners, expressed a preference for traditional methods of applying for SLF. One respondent remarked, "We prefer handling things face-to-face at the office; it's hard to trust an online system when there's no one to guide us." This reflects a lack of trust in digital platforms and underscores the need for capacity-building initiatives. Both government officials and KADIN members emphasized the need for more workshops and training programs to help stakeholders navigate the SIMBG platform and effectively complete SLF applications. These discussions point to a broader need for targeted interventions to enhance digital literacy and build confidence in the system.

5. DISCUSSION

5.1 Public participation as the key driver for SIMBG adoption

The quantitative findings of this study indicate that public participation has the strongest impact on the adoption of the Sistem Informasi Manajemen Bangunan Gedung (SIMBG), suggesting that the more engaged and informed the public is, the more likely they are to adopt digital tools for regulatory processes. This finding aligns with prior studies, such as those by Agyekum et al. [29], which found that public involvement is essential for regulatory compliance in building certification contexts. However, this study expands on previous research by quantifying the strength of this relationship, particularly in the context of SLF certification. Focus Group Discussion (FGD) data reinforces this finding, as participants across all three cities indicated that a lack of awareness and understanding about the SLF process was a major barrier to compliance. For instance, KADIN members in Bandung emphasized that building owners were often unaware of the requirement to obtain SLF until it became necessary for operational permits. This suggests that enhancing public awareness through targeted campaigns could significantly boost SLF certification rates, a notion supported by the findings of Sezen, who discussed the role of education in promoting green building certifications [30].

5.2 The role of communication: Important but secondary

While communication positively influenced SIMBG adoption, its impact was less significant than that of public participation. This could be attributed to inconsistencies in communication efforts highlighted in the FGDs, particularly in Semarang, where business owners expressed frustration over changing regulations and poor updates from local authorities. This suggests that while communication is

necessary for promoting SLF compliance, it is not sufficient on its own. Effective communication needs to be consistent, transparent, and easily accessible to the public. This aligns with findings from Matisoff et al., who noted that communication strategies must be well-structured to facilitate understanding and compliance in certification processes [31]. Furthermore, the FGD discussions revealed that communication was particularly problematic in regions with low digital literacy, such as Sidoarjo. Participants there mentioned that they struggled to understand the requirements communicated through digital platforms like SIMBG, preferring interactions instead. This indicates that digital communication strategies must be complemented with traditional outreach methods to ensure they reach all segments of the population, a sentiment echoed by Wu and Lo [32] who emphasized the importance of tailored communication strategies in promoting building certification.

5.3 SIMBG as a facilitator for SLF certification

The findings confirm that SIMBG adoption plays a crucial role in facilitating SLF certification, mediating the relationship between public participation, communication, and SLF compliance. However, the FGDs revealed significant barriers to SIMBG adoption, particularly related to digital literacy and access. In Sidoarjo, participants highlighted a clear preference for traditional, face-to-face interactions with government officials, citing a lack of trust in digital systems. This underscores the need for local governments to invest in digital literacy programs and provide support for business owners to navigate the SIMBG platform, as suggested by Sezen, who discussed the role of education in promoting green building certifications [30].

Interestingly, while Bandung showed a relatively higher level of adoption due to more frequent government-led training sessions, participants still mentioned that more could be done to simplify the system and make it more user-friendly. These findings suggest that while SIMBG is an effective tool for improving SLF certification rates, its success depends on addressing the technological and capacity-building challenges identified in the FGDs.

5.4 Implications for policy and practice

The findings of this study offer several practical implications for policymakers and local governments, particularly in improving SLF certification compliance through enhanced public participation and the adoption of digital tools like SIMBG. One of the most pressing needs is to enhance public awareness campaigns. The strong correlation between public participation and SIMBG adoption underscores the importance of targeted outreach initiatives. Local governments should collaborate with key business associations such as KADIN to disseminate information about the SLF certification process and educate stakeholders on the advantages of using the SIMBG platform. By raising awareness about these regulations, governments can foster a more engaged and compliant public, as supported by the work of Cherry and Mitchell, who highlighted the importance of organizational culture in promoting certification [33].

Additionally, while communication had a somewhat lesser impact compared to public participation, it remains a crucial factor in the success of SLF certification. Governments need to ensure that communication is clear, consistent, and

accessible to all stakeholders. This might involve utilizing a mix of digital tools and traditional methods such as in-person workshops and seminars, which could help reach a broader audience, including those less familiar with digital communication.

Another critical recommendation is the need to invest in digital literacy programs. The qualitative findings from the FGDs, particularly in Sidoarjo, revealed significant challenges related to digital literacy, which hindered the adoption of SIMBG. To address these barriers, governments should consider offering free training sessions, establishing help desks, and creating tutorial videos that guide building owners and business operators through the SLF application process. These initiatives could bridge the digital divide and empower more users to engage with the SIMBG system effectively, as emphasized by Wu and Lo [32], who discussed the importance of incentives and support in enhancing building certification. Although the SIMBG platform has proven to be an effective tool for facilitating SLF certification, the study highlights ongoing challenges related to its complexity. Simplifying the SIMBG interface and ensuring that it is intuitive for users could significantly improve adoption rates. Governments should invest in making the platform more user-friendly, reducing the technical barriers that currently exist, and ultimately improving the efficiency of the certification process. These measures would not only boost SLF certification rates but also enhance public trust and engagement with digital governance tools.

By triangulating SEM analysis and FGD findings, this study confirms that strengthening public participation initiatives, combined with targeted digital literacy programs, can significantly improve SLF certification compliance. Local governments are strongly encouraged to integrate these insights into future urban safety and governance strategies to enhance building safety and community resilience.

This study confirms that public participation and communication are crucial for the adoption of digital tools like SIMBG, which in turn improves compliance with SLF certification. The qualitative insights from the FGDs provide a deeper understanding of the barriers and enablers of SLF adoption across different cities, highlighting the importance of addressing digital literacy and improving communication strategies. These findings have significant implications for local governments aiming to enhance public participation and streamline building certification processes in Indonesia. Local governments are strongly encouraged to integrate these insights into future urban safety and governance strategies to enhance building safety and community resilience.

6. CONCLUSION

This study provides critical insights into the factors influencing Sertifikat Laik Fungsi (SLF) certification compliance in Indonesia, focusing on the roles of public participation, communication, and the adoption of the Sistem Informasi Manajemen Bangunan Gedung (SIMBG). Using a mixed-method concurrent design, the research demonstrated that public participation is the most significant driver of SIMBG adoption, which in turn positively influences SLF certification rates. Communication, while important, had a secondary effect compared to public participation. This underscores the need for greater public engagement and awareness to improve SLF compliance.

The quantitative results from the SmartPLS analysis confirmed that public participation had a strong, positive impact on SIMBG adoption, while communication had a significant but smaller impact. SIMBG adoption was found to mediate the relationship between public participation, communication, and SLF certification, reinforcing the importance of digital transformation in the public sector. The qualitative data from the Focus Group Discussions (FGDs) enriched the quantitative findings by highlighting barriers to SIMBG adoption, such as low digital literacy, inconsistent communication from authorities, and resistance to digital platforms among older business owners.

The study's findings have important implications for policymakers and local governments. First, public awareness campaigns must be prioritized to increase understanding and engagement with SLF certification processes. Collaboration with business associations like KADIN can help disseminate information effectively. Second, governments must improve their communication strategies by ensuring that information is clear, consistent, and accessible through both digital and traditional channels. Third, there is a pressing need to invest in digital literacy programs to enable more widespread use of SIMBG, especially in regions where technological adoption is low. Lastly, efforts to simplify the SIMBG platform and make it more user-friendly will further enhance its adoption and, consequently, SLF certification rates.

This research contributes to the existing body of knowledge by quantifying the relationships between public participation, communication, and digital platform adoption in the context of building certification. It extends previous studies by providing a robust empirical model and offering practical solutions to overcome the challenges identified. The study also highlights the critical role of digital governance tools like SIMBG in modernizing public service delivery.

For future research, a broader study encompassing more diverse regions, including rural or semi-urban areas, would provide a more comprehensive understanding of the factors influencing SLF compliance nationwide. Additionally, future studies could explore the effectiveness of different public awareness strategies and their long-term impact on SLF certification rates. By addressing these areas, future research can further improve public participation and enhance the adoption of digital platforms in the regulatory landscape of Indonesia and beyond.

This study provides clear evidence that enhancing public participation and streamlining digital tools are key to improving SLF certification rates in Indonesia. The findings offer valuable insights for policymakers seeking to strengthen public engagement in building safety regulations and highlight the transformative potential of digital platforms like SIMBG in improving regulatory compliance.

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