

The Effect of PBG and SLF Permit Costs on Sustainable Building Development in Badung Regency: The Moderating Role of Technical Factors

Ni Kadek Nasya Putri Pratiwi¹, Ngakan Ketut Acwin Dwijendra², I Dewa Gede Agung Diasana Putra³

Master's Program in Sustainable Development and Finance, Graduate School, Udayana University, Denpasar, Indonesia

Corresponding Author: Ni Kadek Nasya: nasyaputri554@gmail.com

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ABSTRACT

Sustainable building development requires a permit system that safeguards safety, regulatory compliance, and environmental protection. However, permit costs and technical complexity may become barriers to legalizing buildings, particularly in areas with intensive construction activity. This study examines the effect of Building Approval (Persetujuan Bangunan Gedung/PBG) and Certificate of Feasible Function (Sertifikat Laik Fungsi/SLF) permit costs on sustainable building development in Badung Regency, Indonesia, and tests the moderating role of technical factors. A quantitative survey was conducted among 100 respondents who had experience with PBG-SLF applications. The population proxy was 1,284 applicants, and respondents were selected using simple random sampling. Data were collected through a five-point Likert questionnaire and analyzed using descriptive statistics, simple linear regression, and Moderated Regression Analysis (MRA). The results show that permit costs significantly affect sustainable building development, with $R = 0.948$ and $R^2 = 0.898$. Technical factors significantly moderate the relationship between permit costs and sustainability (interaction significance = 0.002), while the moderation model explains 97.4% of the variance. Among the sustainability dimensions, the economic dimension is the most strongly affected ($\beta = 0.957$; $R^2 = 0.916$), followed by the social ($\beta = 0.807$; $R^2 = 0.652$) and environmental dimensions ($\beta = 0.761$; $R^2 = 0.579$). The findings indicate that permit-fee policy should be proportional to building risk and accompanied by simpler technical requirements, improved digital services, and greater transparency.

INTRODUCTION

Building permits are an important regulatory instrument for ensuring that construction complies with safety, technical, functional, spatial, and environmental standards. In Indonesia, Building Approval (PBG) replaced the former Building Construction Permit (IMB), while the Certificate of Feasible Function (SLF) is used to confirm that a completed building is suitable for its intended use. The implementation of PBG and SLF is therefore closely connected to the quality and sustainability of the built environment (Kementerian PUPR, 2021).

From a sustainable-development perspective, building regulation should balance economic, social, and environmental interests (Brundtland, 1987; Munasinghe, 2002). Permit costs are part of the compliance cost borne by applicants. When the cost of compliance becomes disproportionate to the perceived benefits, applicants may postpone or avoid formal legalization. This condition can reduce regulatory compliance and weaken the ability of permit systems to control building quality, safety, and environmental performance (OECD, 2023).

The issue is particularly relevant in Badung Regency, Bali, where construction activity is closely associated with tourism, housing, and commercial development. The thesis underlying this article identifies permit costs, technical-document requirements, the digital permitting system (SIMBG), and verification processes as recurring concerns in PBG-SLF implementation. The study therefore treats permit cost as an independent variable, sustainable building development as the dependent variable, and technical factors as a moderating variable.

Previous studies have generally examined building permits from procedural, regulatory, or administrative perspectives. Research on sustainable construction has also emphasized regulation and governance, while studies on permit financing have focused on fee levels and procedural complexity. The research gap addressed here is the limited empirical examination of how PBG-SLF permit costs relate to the economic, social, and environmental dimensions of sustainable building development while considering technical factors as a moderator.

Accordingly, this study aims to: (1) analyze the effect of PBG and SLF permit costs on sustainable building development in Badung Regency; (2) test whether technical factors moderate that relationship; and (3) compare the strength of the permit-cost effect across the economic, social, and environmental dimensions.

LITERATURE REVIEW

Sustainable Development and Building Regulation

Sustainable development requires an appropriate balance among economic viability, social inclusion, and environmental protection (Brundtland, 1987). In building regulation, sustainability is not achieved solely through technical

standards. Accessibility, affordability, and the ability of communities to comply with formal requirements are also relevant. A permit system that is technically rigorous but financially inaccessible may unintentionally encourage informal construction.

Regulatory Compliance and Permit Costs

Regulatory compliance can be understood in relation to the costs, benefits, and risks perceived by regulated actors. Permit costs include government fees as well as technical and professional costs required to prepare compliant documentation. OECD (2023) emphasizes that compliance costs may influence behavior when administrative and technical burdens become excessive. In the building sector, this suggests that higher PBG-SLF costs can increase barriers to legalization and, consequently, increase obstacles to sustainable development.

Technical Factors as a Moderator

Technical factors include the complexity of technical documents, building-risk classification, the usability of SIMBG, and the duration of technical verification. Public-service efficiency theory suggests that service quality depends on minimizing unnecessary cost, time, and procedural complexity. Thus, technical complexity may strengthen the effect of permit costs on sustainability barriers, whereas clearer requirements and more efficient digital services may weaken that effect.

HYPOTHESES

H1: PBG and SLF permit costs significantly affect sustainable building development in Badung Regency.

H2: Technical factors significantly moderate the effect of PBG and SLF permit costs on sustainable building development.

H3: The effect of PBG and SLF permit costs on the economic dimension is greater than their effects on the social and environmental dimensions.

METHODS

Research Design and Sample

This study used a quantitative explanatory survey design. The research was conducted in Badung Regency, Bali, a region characterized by intensive building activity and the implementation of PBG-SLF through SIMBG. The thesis used 1,284 PBG-SLF applicants in 2024 as a population proxy. Using the Slovin formula with a 10% margin of error produced a minimum sample requirement of 93 respondents; the study subsequently used 100 respondents to improve representativeness and accommodate potentially incomplete data. Simple random sampling was used.

Variables and Measurement

All variables were measured using a five-point Likert scale. Permit cost (X) was measured with five items covering technical-consultant costs, permit fees, the effect of total costs on building decisions, delays in legalization, and the perception that permit cost is a major obstacle. Sustainable building development (Y) was measured with six items representing economic, social, and environmental dimensions. The statements were framed as barriers; therefore, higher scores indicate greater obstacles to sustainability. Technical factors (M) were measured with four items covering technical-document complexity, building-risk classification, SIMBG usability, and the duration of technical verification.

Table 1. Variables and indicators

Variable	Indicators	Items
Permit cost (X)	Technical permit-cost burden; effect of cost on building decisions	X1-X5
Sustainable building development (Y)	Economic, social, and environmental dimensions	Y1-Y6
Technical factors (M)	Technical-document complexity; process and verification constraints	M1-M4

Data Analysis

Instrument quality was assessed through validity and reliability testing. Descriptive statistics were used to summarize respondent characteristics and variable perceptions. Simple linear regression was used to test H1 and to estimate the effect of permit costs on each sustainability dimension. MRA was used to test H2 through the interaction between permit cost and technical factors. The moderation model was specified as $Y = \beta_0 + \beta_1X + \beta_2M + \beta_3(X \times M) + \varepsilon$. H3 was assessed by comparing standardized beta coefficients and coefficients of determination across the three sustainability dimensions.

RESULTS AND DISCUSSION

Respondent Characteristics

The study analyzed 100 valid respondents. Most respondents had completed senior high school (71%), followed by undergraduate education (27%) and postgraduate education (2%). By occupation, private-sector employees accounted for 47% and entrepreneurs for 34%. Regarding the year of PBG-SLF processing, 97% of respondents had experience in 2025 and 3% in 2024. By building type, 50% concerned business buildings, 45% residential buildings, and 5% mixed-use buildings. These characteristics indicate substantial representation from applicants involved in productive and commercial building activity.

Table 2. Selected respondent characteristics

Characteristic	Category	n	%
Education	Senior high school	71	71
	Bachelor	27	27
	Postgraduate	2	2
Occupation	Private employee	47	47
	Entrepreneur	34	34
PBG-SLF year	2025	97	97
	2024	3	3
Building type	Business	50	50
	Residential	45	45
	Mixed	5	5

Descriptive Results and Instrument Quality

The thesis reports that the sustainable-building-development variable had a mean score of 4.28 (85.60% of the maximum score), while the technical-factor variable had the highest mean of 4.61 (92.20%). These values indicate that respondents perceived permit-related sustainability barriers and technical complexity as high. The instrument testing showed that all questionnaire items had r-count values above the r-table value of 0.1966 at the 5% significance level, indicating item validity.

The descriptive pattern is consistent with the study's conceptual framework: permit costs are perceived not merely as administrative payments but as burdens that can influence building decisions and legalization behavior. The high technical-factor score further indicates that technical documentation, SIMBG, risk classification, and verification are important components of the permitting experience.

Effect of Permit Costs on Sustainable Building Development

The simple linear regression model produced a very strong relationship between permit costs and sustainable building development ($R = 0.948$). The coefficient of determination was $R^2 = 0.898$, indicating that 89.8% of the variance in the sustainability-barrier score was explained by permit costs in this model. The regression coefficient for permit cost was positive ($B = 0.893$; standardized $\beta = 0.948$), with a significance value below 0.05. Therefore, H1 was supported.

Table 3. Simple regression of permit costs on sustainable building development

Statistic	Value
R	0.948
R ²	0.898
Adjusted R ²	0.897
F	860.701
Significance	< 0.05
B (permit cost)	0.893
Standardized β	0.948

Because the dependent-variable items represent barriers to sustainability, the positive coefficient means that greater perceived permit costs are associated with greater obstacles to sustainable building development. This finding supports the regulatory-compliance perspective: when compliance costs rise, applicants may face stronger incentives to postpone or avoid formal legalization. The finding also aligns with previous discussion in the thesis regarding permit costs and reliance on technical consultants (Santoso, 2021; Putri & Suyasa, 2022).

Moderating Role of Technical Factors

The MRA model included permit cost (X), technical factors (M), and their interaction (X×M). The model produced $R = 0.987$ and $R^2 = 0.974$, meaning that 97.4% of the variance in the sustainability-barrier score was explained by the three predictors together. The interaction term was statistically significant ($p = 0.002$), supporting H2.

Table 4. Moderated Regression Analysis

Predictor	B	Std. Beta	t	Sig.
Permit cost (X)	1.606	1.705	5.147	< 0.05
Technical factor (M)	1.476	1.290	4.710	< 0.001
X × M	0.002	-1.822	-3.226	0.002

The significant interaction indicates that the effect of permit costs depends on technical conditions. In practical terms, more complex technical requirements, longer verification processes, and difficulties in using SIMBG can increase the burden associated with permit costs. This result is consistent with public-service efficiency theory because procedural and technical inefficiency can transform a nominal permit fee into a larger overall compliance burden.

The finding also supports the thesis argument that improving sustainability cannot rely only on adjusting tariffs. Simplification of technical requirements, clearer documentation standards, improved digital-service reliability, and faster verification can reduce the combined burden experienced by applicants.

Differences Across Sustainability Dimensions

Separate simple regressions were estimated for the economic, social, and environmental dimensions. The economic dimension showed the strongest relationship with permit costs, with $R = 0.957$, $R^2 = 0.916$, and standardized $\beta = 0.957$. The social dimension produced $R = 0.807$, $R^2 = 0.652$, and $\beta = 0.807$, while the environmental dimension produced $R = 0.761$, $R^2 = 0.579$, and $\beta = 0.761$.

Table 5. Comparison of permit-cost effects across sustainability dimensions

Dimension	Standardized β	R^2	Interpretation
Economic	0.957	0.916	Strongest
Social	0.807	0.652	Strong
Environmental	0.761	0.579	Strong

The economic dimension is therefore the most sensitive to permit costs, supporting H3. This is reasonable because permit costs directly affect the financial feasibility and efficiency of building projects. The social effect is reflected more indirectly through participation and willingness to complete legalization, while the environmental effect is related to compliance with technical and environmental standards. The result supports the Triple Bottom Line perspective by showing that a single regulatory-cost mechanism can have different magnitudes of effect across sustainability dimensions.

Policy Implications

The findings have several implications for building-permit governance in Badung Regency. First, fee structures should be proportional to building function and risk so that lower-risk and socially beneficial buildings are not burdened by costs designed for more complex projects. Second, technical requirements should be simplified without reducing safety standards. Third, SIMBG should be strengthened through better usability, reliable infrastructure, help-desk support, and clearer guidance. Fourth, the competence of public officers and technical professionals should be continuously improved. Finally, the government should publish transparent information on costs, procedures, and service times so applicants can anticipate the full compliance burden.

Limitations

The study is limited geographically to Badung Regency, whose tourism-oriented economic and spatial characteristics may differ from other regions. The analysis is also based on respondent perceptions measured through a questionnaire, and the dependent variable represents barriers to sustainability rather than direct physical measures of environmental performance. Future studies could use larger multi-regional samples, longitudinal administrative data, and objective building-performance indicators.

CONCLUSION

This study demonstrates that PBG and SLF permit costs significantly affect sustainable building development in Badung Regency. Higher perceived permit costs are associated with greater barriers to sustainable development, with the simple regression model explaining 89.8% of the variance. Technical factors also significantly moderate the relationship, indicating that technical complexity, digital-system constraints, and verification processes can intensify the effect of permit costs. Among the three sustainability dimensions, the economic dimension is the most strongly affected, followed by the social and environmental dimensions. The findings suggest that sustainable building-permit policy should combine proportional fee structures with technical simplification, digital-service improvement, transparency, and applicant support. Such reforms can improve regulatory compliance while maintaining the safety and sustainability objectives of PBG and SLF.

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