

RESEARCH ARTICLE

A Hybrid IFRS–GRI Measurement Model for Assessing Public-Sector Sustainability Reporting in Asian Governments

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ABSTRACT

This study develops a hybrid measurement framework to assess the consistency and depth of sustainability reports published by governments in four Asian countries: Indonesia, Malaysia, Singapore, and Hong Kong. Although global reporting standards are increasingly developing, reporting practices in the region remain diverse, the indicators used are not yet uniform, and no evaluation tools are available that can reliably produce cross-country comparisons. To bridge this gap, this study integrates IFRS S1 and S2 with GRI Standards to develop the Public Sector Sustainability Disclosure Index (PSSDI). Using a phased qualitative design, this study developed an index comprising four pillars and 32 sub-indicators. The findings show significant differences in maturity levels, institutional capacity, and the quality of information disclosed. Singapore and Hong Kong are at the most advanced level, Malaysia is at an intermediate stage, while Indonesia is still in the early phase. These results provide an empirical basis for promoting harmonization of reporting at the regional level and identifying institutional and technical barriers that hinder cross-country comparability. The study offers an analytical model for governments to strengthen national reporting systems, improve transparency, and support more targeted policy decisions on climate issues.

Keywords: Sustainability Reporting; IFRS S1 & S2; GRI Index; Public Sector; Asia

1. Introduction

This study aims to develop a hybrid measurement model to assess the compliance and comprehensiveness of public-sector sustainability reporting by integrating financial materiality derived from IFRS S1/S2 standards and impact materiality embedded in the GRI Standards ^[1]. The proposed model is piloted across four Asian jurisdictions, such as Singapore, Hong Kong, Malaysia, and Indonesia, to explore variations in the maturity of sustainability reporting practices within public-sector institutions. The urgency of this study stems from the absence of an assessment framework capable of capturing the dual accountability inherent in public governance, in which governments are responsible not only for financial stewardship but also for socio-environmental outcomes. This gap complicates efforts to assess alignment among sustainability reporting, policy mandates, and stakeholder expectations, particularly amid escalating ecological pressures that demand transparency and evidence-based public decision-making. Consequently,

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aligning sustainability reporting practices with public governance logic and government performance mandates has become an increasingly critical concern within the global sustainability agenda.

Climate change represents one of the most pressing governance and policy challenges confronting Asia [2], [3]. The region faces escalating environmental stress driven by rapid industrialization, deforestation, and urbanization, contributing to temperatures nearly double the global average [4], [5]. Record-breaking heatwaves, rising sea levels, and recurrent climate-related disasters have intensified demands for stronger climate accountability and transparency from governments, underscoring the importance of credible sustainability reporting as a governance instrument [4], [6]. This highlights the vital role of the audience in fostering credible disclosures to meet urgent ecological challenges.

Unlike the corporate sector, where climate-related disclosures are increasingly standardized and mandated, public institutions across Asia lack a comparable and coherent sustainability reporting framework. Existing practices remain fragmented, largely voluntary, and unevenly developed across jurisdictions [7], [8], [9], [10]. Variations in governance capacity, regulatory enforcement, and data transparency further constrain the comparability and accountability of public-sector disclosures [10], [11]. As a result, sustainability reporting in many public institutions remains at an early stage of ESG integration, often characterized by symbolic compliance rather than substantive performance disclosure. The absence of standardized disclosure mechanisms not only erodes public trust but also limits the evidence base required for effective climate policy formulation. In this context, alignment with international frameworks such as IFRS S1 (General Sustainability-Related Disclosures), IFRS S2 (Climate-Related Disclosures), and the GRI Standards becomes essential to ensure coherence across governance structures, strategic priorities, risk management processes, and performance measurement systems.

Although prior studies have extensively examined sustainability disclosure frameworks such as IFRS S1/S2, ISSB, and GRI within the corporate sector [12], [13], [14], their application to public-sector contexts remains limited [15], [16], [17], [18], particularly in Asia. Public-sector sustainability reporting faces structural challenges, including fragmented inter-agency data systems, inconsistent indicators across institutions, and limited technical capacity to operationalize global standards [16], [17]. Institutional theory suggests that governments' adoption of international reporting standards is shaped by coercive and normative pressures from global organizations, donor agencies, and peer jurisdictions [19]. Complementing this view, legitimacy theory explains sustainability disclosure as a mechanism through which governments seek to maintain social trust and demonstrate accountability to citizens [20], while stakeholder theory emphasizes the need for inclusive disclosure practices that address the diverse information demands of policymakers, civil society, and oversight bodies. However, the absence of a public-sector-oriented measurement framework constrains the practical operationalization of these theories within government accountability systems.

The development of the Public Sector Sustainability Disclosure Index (PSSDI) is grounded in three theoretical perspectives. Institutional theory informs how governments respond to international norms and peer pressures in adopting sustainability disclosure practices [21]. Legitimacy theory elucidates why governments disclose sustainability information to signal alignment with global norms and reinforce public trust, particularly in the context of climate governance [22]. Stakeholder theory underscores the necessity of comprehensive disclosure to accommodate the heterogeneous informational needs of citizens, policymakers, donors, and audit institutions [23]. By translating these theoretical constructs into measurable disclosure indicators, PSSDI operationalizes abstract governance concepts into an applied assessment framework tailored to public-sector contexts.

By integrating the financial materiality logic of IFRS S1/S2 with the impact materiality orientation of the GRI Standards, this study introduces a hybrid framework that bridges fiscal accountability and broader socio-environmental transparency. Theoretically, the study extends institutional, legitimacy, and stakeholder

perspectives by demonstrating how global sustainability standards can be adapted to the institutional realities of public governance. In practice, the research provides an initial foundation for developing a National Sustainability Reporting Measurement Index for government entities in Indonesia, while offering a regional reference point for other Asian jurisdictions seeking to enhance the transparency, comparability, and accountability of public-sector sustainability reporting. This framework is designed to be flexible and scalable, enabling adaptation to diverse governance structures and institutional capacities across public-sector entities and jurisdictions.

Existing sustainability reporting research has predominantly focused on corporate entities, with measurement models designed to capture firm-level compliance with IFRS or GRI standards [12], [13], [14]. In contrast, sustainability disclosure in the public sector is shaped by distinct accountability logics, governance mandates, and non-market objectives, rendering the direct transfer of corporate-based indices analytically insufficient [24], [25]. Prior public-sector studies have tended to emphasize descriptive transparency or institutional readiness, without offering an integrated measurement framework that simultaneously captures financial and impact materiality across an Asian context [1], [26].

Accordingly, this study positions the PSSDI not as a standalone invention, but as a theoretically informed extension of existing disclosure and maturity frameworks, adapted to the institutional characteristics of public governance. By combining the structural rigor of IFRS S1/S2 with the impact-oriented logic of the GRI Standards, PSSDI addresses a critical gap in the literature on public-sector sustainability measurement. Based on this background, the study addresses the following research questions:

1. **RQ1:** How can IFRS S1/S2 and the GRI Standards be integrated into a hybrid measurement model to assess compliance and disclosure coverage in public-sector sustainability reporting?
2. **RQ2:** How do variations in sustainability reporting maturity manifest across public-sector institutions in selected Asian countries?

In line with these questions, the study is positioned as a framework development and pilot application, aiming to demonstrate the analytical feasibility and conceptual robustness of the proposed index rather than to generate statistically generalizable cross-country rankings. The novelty of this research does not lie in claiming the absence of sustainability reporting frameworks, but in the systematic adaptation and operationalization of IFRS S1/S2 and GRI Standards into a public-sector-specific measurement index that captures the dual accountability of government institutions. This area remains underdeveloped in existing corporate-oriented approaches.

2. Materials and methods

This study adopts a phased qualitative research design integrating systematic content analysis, expert panel validation, and cross-country comparative case analysis. The methodological approach is designed to develop, refine, and pilot-test a hybrid measurement framework, the Public Sector Sustainability Disclosure Index (PSSDI), that operationalises institutional, legitimacy, and stakeholder perspectives within public-sector sustainability reporting. As illustrated in Figure 1, the research is structured into sequential methodological phases that guide the development, validation, and empirical application of the proposed framework. This process aims to demonstrate the framework's potential to improve reporting practices and to inspire trust among researchers, policymakers, and professionals. The **expected outcomes** of this study are: (1) a hybrid indicator framework integrating IFRS S1/S2 and GRI Standards, and (2) cross-country evidence on the maturity of sustainability reporting in the Asian public sector.

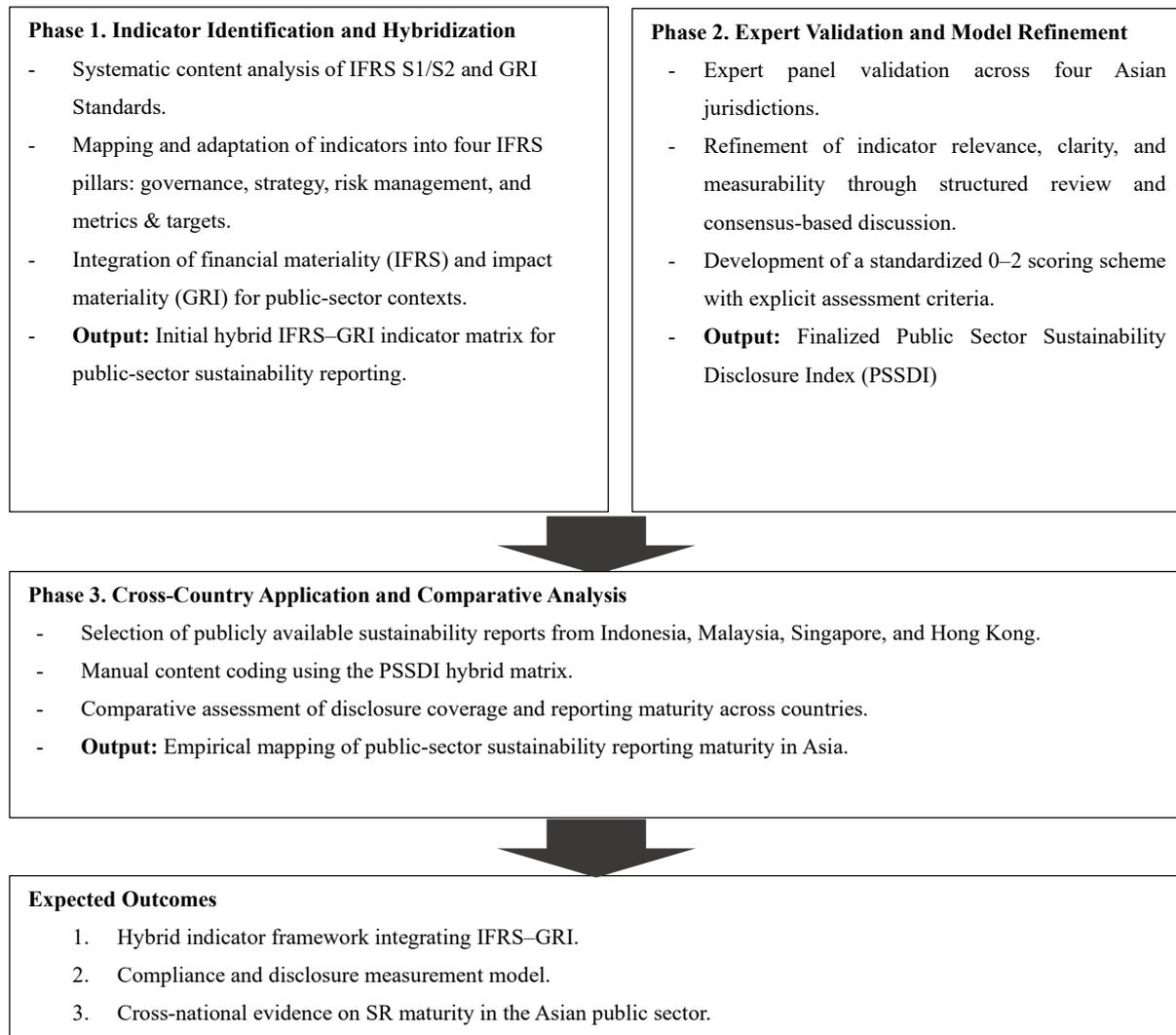


Figure 1. Methodological Phase

Phase 1: Indicator Identification and Hybrid Framework Development

As conceptually illustrated in Figure 2, Phase 1 focuses on identifying the area of convergence between the financial materiality orientation embedded in IFRS standards and the impact materiality emphasis of the GRI Standards. Phase 1 involved a systematic content analysis of IFRS S1, IFRS S2, and the GRI Standards to identify disclosure indicators relevant to public-sector sustainability reporting. Indicators were first mapped onto the four disclosure pillars of IFRS S1/S2, which involved Governance, Strategy, Risk Management, and Metrics & Targets, and subsequently adapted to reflect public-sector characteristics, including non-market objectives, multi-stakeholder accountability, and policy-driven performance mandates. Overlapping elements between financial materiality, emphasized in IFRS standards, and impact materiality embedded in GRI Standards were synthesized into an initial hybrid indicator matrix. This process resulted in a preliminary framework comprising four pillars and 32 sub-indicators, which formed the conceptual foundation of the PSSDI model.

The exploratory and pilot-oriented nature of the study guided the selection of one to two public institutions per country. The objective was not national representativeness, but rather to test the conceptual robustness, adaptability, and operational feasibility of the proposed framework across different governance settings. Furthermore, the selection was constrained by data availability, as government-level sustainability

reports remain limited and unevenly published across Asian countries, particularly in Indonesia and Malaysia. Accordingly, the selected institutions serve as critical cases that reflect varying mandates, reporting capacities, and levels of institutional maturity, consistent with methodological approaches to framework development and pilot testing.

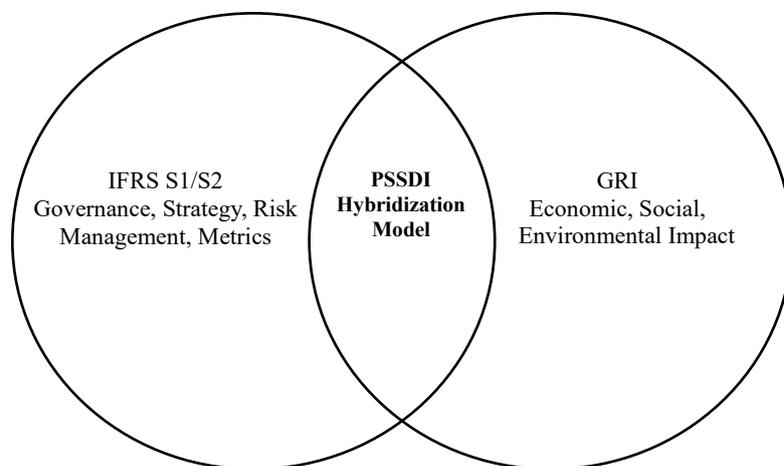


Figure 2. Public Sector Sustainability Disclosure Index (PSSDI): The IFRS–GRI Hybrid Model combines the structural rigor of IFRS S1/S2 with the social relevance of GRI Standards to assess compliance and disclosure coverage in public sector sustainability reporting.

Phase 2: Expert Panel Validation

Phase 2 focused on expert validation to refine the relevance, clarity, and applicability of the indicators to public-sector contexts. Validation was conducted through expert panel discussions structured as focused group discussions (FGDs), complemented by independent indicator assessments. A total of **nine experts** participated in the validation process, representing four jurisdictions:

- Malaysia, Singapore, and Hong Kong were each represented by two experts, for a total of six across the three countries.
- Indonesia was represented by three experts, reflecting its dual role as the primary development context of the PSSDI framework.

Experts were selected based on the following criteria:

1. Professional experience in sustainability practice, evidenced by a portfolio of work in public-sector advisory roles, or sustainability-related projects at the national or regional level, ensuring familiarity with IFRS S1/S2, GRI Standards, or comparable sustainability reporting frameworks;
2. Research expertise in sustainability and public governance, demonstrated through academic publications, policy research, or applied studies focusing on sustainability reporting, ESG governance, or public-sector accountability in Asian contexts.

Each expert independently reviewed all indicators using a structured evaluation form assessing indicator relevance, conceptual clarity, and measurability. This process incorporated explicit criteria aligned with international standards and public-sector contexts to ensure validity. This was followed by moderated group discussions to resolve differences, refine indicator definitions, and eliminate redundancies. The validation process emphasized conceptual robustness rather than statistical generalization, consistent with the exploratory nature of framework development.

This study adopts a three-point ordinal scoring scale (0–2) to assess the depth and quality of public-sector sustainability disclosure, addressing concerns about scoring granularity. A score of 0 indicates the absence of relevant disclosure. A score of 1 represents partial disclosure, in which the issue is addressed qualitatively or descriptively, without quantitative indicators, explicit targets, or clear linkage to governance and risk management processes. A score of 2 reflects comprehensive disclosure, characterized by clearly assigned governance responsibility, measurable indicators or targets, and a consistent, structured reporting approach.

The use of a three-point ordinal scale follows the established disclosure index tradition in accounting research, which recognizes that disclosure quality is difficult to observe directly. By aligning with prior studies ^{[27], [28]}, this approach aims to build trust and confidence in the methodology, showing it is grounded in recognized academic practices. Although the 0–2 scale involves informed judgment, potential subjectivity was mitigated by explicit scoring criteria that aim to ensure transparency and fairness. Consensus-based expert discussions and multi-country expert validation further reinforce the integrity of the assessment, emphasizing that the process is structured and deliberate for exploring diverse reporting practices.

Phase 3: Cross-Country Application and Comparative Analysis

In Phase 3, the validated PSSDI framework was applied to sustainability-related reports from selected public institutions across four countries: the East Java Attorney General’s Office and the Banyuwangi Water Agency (Indonesia); the Ministry of Investment, Trade and Industry (MITI) (Malaysia); the Ministry of Sustainability and the Environment (MSE) and the Public Utilities Board (PUB) (Singapore); and the Hong Kong Monetary Authority (HKMA) and the Hong Kong Observatory (HKO).

Reports were selected based on accessibility, institutional relevance, and their explicit engagement with sustainability or climate-related governance. All reports were treated as public-sector sustainability disclosures, regardless of variations in format, scope, or reporting maturity, to ensure analytical consistency.

Content analysis followed a structured coding protocol using a hybrid IFRS–GRI matrix. The hybrid matrix is a manually developed spreadsheet-based coding framework that aligns each IFRS S1/S2 disclosure pillar with the corresponding GRI-derived indicators. No automated software was employed; manual coding was chosen to allow contextual interpretation of public-sector disclosures, consistent with qualitative content analysis practices.

Each report was independently coded by two researchers using the same coding manual derived from the validated PSSDI indicators. Coding discrepancies were discussed iteratively until consensus was achieved. Given the limited sample size and exploratory purpose of the pilot application, formal inter-coder reliability statistics were not calculated. Instead, consistency was ensured through calibration sessions before final coding.

Comparative analysis focused on mapping variations in disclosure completeness, depth, and maturity across countries. To facilitate cross-country comparability, all reports were assessed using the same hybrid indicator matrix and scoring criteria. The Capability Maturity Model Integration (CMMI) framework was subsequently used to classify reporting maturity levels, enabling structured comparison across jurisdictions with differing governance capacities.

Methodological Outputs

The methodological design ensures both theoretical grounding and practical applicability, resulting in:

1. A validated hybrid IFRS–GRI indicator framework tailored to public-sector sustainability reporting (PSSDI);

2. Empirical insights into the maturity of sustainability reporting practices among selected Asian public institutions; and
3. Policy-relevant recommendations to support the development of a National Sustainability Reporting Measurement Index for government entities in Indonesia aligned with global disclosure standards.

3. Results

3.1. Development of the Public Sector Sustainability Disclosure Index (PSSDI) Metrics

This study developed the Public Sector Sustainability Disclosure Index (PSSDI) as a hybrid disclosure measurement framework integrating IFRS S1/S2 and GRI Standards to assess both compliance and disclosure coverage in public-sector sustainability reporting. Its purpose is to inform researchers and practitioners about the development, structure, and validation of the PSSDI framework, emphasizing its role as a tool for structured evaluation rather than proposing a new reporting logic. PSSDI is positioned as a theoretically informed extension of existing corporate-oriented frameworks, adapted to reflect the distinctive accountability structures, governance mandates, and non-market objectives of public institutions.

The architecture of the PSSDI follows the four disclosure pillars of IFRS S1/S2, such as Governance, Strategy, Risk Management, and Metrics & Targets, while embedding GRI principles related to materiality, stakeholder engagement, and accountability. IFRS contributes structural rigor through its emphasis on financially material sustainability risks, whereas GRI provides contextual depth by operationalizing impact materiality and stakeholder responsiveness. Their integration produces what this study conceptualizes as **integrated materiality**, linking monetary accountability with socio-environmental responsibility in public governance contexts, thereby validating the framework's robustness and applicability.

The initial mapping process identified more than 100 disclosure elements across IFRS and GRI standards. These elements were systematically screened for relevance to public-sector mandates, climate governance, and institutional accountability. Through iterative refinement and expert validation, the indicators were consolidated into **32 hybrid sub-indicators**, achieving a balance between analytical comprehensiveness and operational feasibility. This reduction responds to documented concerns regarding reporting overload and limited implementation capacity in public institutions^{[29], [30]}.

Expert validation through focus group discussions involving academics and practitioners from Indonesia, Malaysia, Singapore, and Hong Kong confirmed the conceptual coherence and contextual relevance of the model. Experts emphasized that the hybrid structure captures the dual accountability of governments: stewardship over public finances and responsibility for environmental and social outcomes. The validation process underscores the framework's credibility and ensures it aligns with real-world public sector needs. The final PSSDI framework aligns IFRS disclosure logic with GRI-based public accountability elements, structured as follows:

- **Governance indicators** integrate IFRS oversight requirements with GRI's emphasis on ethical conduct, supervisory responsibility, and participatory accountability.
- **Strategy indicators** combine forward-looking IFRS risk disclosures with GRI perspectives on SDG alignment, climate adaptation, and long-term policy impacts.
- **Risk management indicators** reframe corporate risk concepts into public policy and program risks, reflecting the government's dual role as regulator and service provider.
- **Metrics and target indicators** bridge IFRS's quantitative discipline with GRI's outcome-oriented logic, linking performance metrics to social and environmental impacts.

Each indicator was assessed using a three-point ordinal scale (0–2), enabling systematic comparison across institutions and jurisdictions. Table 1 summarizes the finalized PSSDI indicators derived from IFRS S1/S2 and GRI Standards. Collectively, the PSSDI framework represents a methodological advancement in adapting corporate sustainability disclosure logics to public-sector governance, moving beyond descriptive transparency toward structured, evaluative benchmarking of disclosure maturity.

Table 1. PSSDI Metric Development

Pillar	Sub-Code	IFRS S1 Focus	IFRS S2 Focus	GRI Adjustment	Description of Hybridization Model
Governance	G1(a1)	Sustainability governance structure	Climate risk supervisor	GRI 2-9, 2-12	Disclosure of the sustainability governance structure, listing the bodies/committees/positions responsible for sustainability and climate issues
	G1(a2)	Sustainability oversight mandate	Climate oversight mandate	GRI 2-13	Mandate and Terms of Reference (TOR) cover ESG and climate transition roles.
	G1(a3)	Sustainability Competencies & Training	Climate Competency	GRI 2-17, 3-3(d)	Leadership competency enhancement program in monitoring sustainability risks & opportunities
	G1(a4)	Reporting mechanism to supervisors	Reporting on climate risks and opportunities	GRI 2-18	Frequency and format of consistent sustainability reporting to leadership
	G1(a5)	Sustainability in strategy & decisions	Integration of climate in risk & decision-making	GRI 2-22, 2-23	Integration of sustainability and climate issues into strategy and public policy trade-offs
	G1(a6)	Sustainability-based remuneration	Climate-based remuneration	GRI 2-19, 2-20	Remuneration/incentives for leaders related to the achievement of sustainability targets
	G2(b1)	Delegation of operational roles	Delegation of climate risk management	GRI 2-15	Existence of a sustainability coordination unit/function and cross-functional coordination mechanisms
	G2(b2)	Internal control of sustainability	Integration of climate risk into internal processes	GRI 2-16	Integration of ESG risk management into internal oversight systems & operational management
Strategy	S1(a1)	Material risks & opportunities	Physical & transition climate risks	GRI 3-1, 3-2	Identification of material sustainability and climate issues for the public and stakeholders
	S1(a2)	Timeframe	Risk and opportunity timeframe	GRI 3-3	Setting the time horizon (P/M/P) for risks & opportunities
	S1(a3)	Horizon for each risk/opportunity	Climate horizon per risk category	GRI 3-3	The impact of risks and opportunities on public services and the value chain
	S2(a1)	Current & future impacts	The impact of climate on public service models	GRI 201, 302–303	Location-based risk identification (floods, coastal areas, extreme heat, etc.)
	S2(a2)	Risk concentration	Locations/assets vulnerable to climate change	GRI 303-1, 304-2	Government transition strategies, service innovations, and green investments
	S3(a1)	ESG strategic response	Adaptation/mitigation plans	GRI 201-2, 302-4, 305	Annual reporting on strategy progress and target achievement
	S3(a2)	Evaluation of ESG strategy	Climate plan progress	GRI 3-3(c)	Impact of policies on the economy, society, and the environment

Pillar	Sub-Code	IFRS S1 Focus	IFRS S2 Focus	GRI Adjustment	Description of Hybridization Model
		progress			
	S3(a3)	Trade-off considerations	Mitigation/adaptation on trade-offs	GRI 2-23	The impact of climate change on financing and monetary sustainability
	S4(a1)	Short-term financial impacts	Resilience of scenarios to public monetary conditions	GRI 201-2	Use of climate scenarios in long-term planning
	S4(a2)	Long-term impacts	Financial/strategic implications	GRI 201-2, 207	An integrated ESG risk management framework with public sector ERM
Risk Management	R1(a1)	Risk identification methods	Climate risk identification	GRI 3-3(b)	Use of scientific projections and climate models in risk assessment
	R1(a2)	Scenario analysis	Probability/severity analysis	GRI 201-2	Risk assessment of public service assets & service continuity
	R1(a3)	Risk assessment	Climate risk assessment	GRI 3-3(b)	Risk priority (probability & level of impact on the public)
	R1(a4)	Risk priority	Climate risk priority	GRI 3-3	Monitoring & periodic updates of risk mitigation strategies
	R1(a5)	Risk monitoring	Climate risk monitoring	GRI 2-23	Identification of sustainability opportunities (energy efficiency, circular economy, etc.)
	R2(a1)	Opportunity monitoring	Integration of climate opportunities into ERM	GRI 302-306	Standardized GHG emissions reporting (Scope & coverage of public organizations)
Metrics & Targets	M1(a1)	Metric disclosure	Scope 1-3 Emissions	GRI 305	Specific metrics per public service function
	M1(a2)	Internal metrics	Emissions intensity	GRI 305-4	Public asset resilience & facility efficiency indicators
	M1(a3)	Industry-specific metrics	Climate adaptation	GRI 302-303	Clarity of metric methodology (base year, time coverage, third-party verification)
	M2(a1)	Formula, assumptions, validation	Mitigation targets	GRI 305-5	Risk reduction and adaptation capacity enhancement targets
	M2(a2)	Clarity of metrics	Adaptation targets	GRI 303-5	Annual reporting on progress toward targets
	M3(a1)	Target + value + period	Progress on emissions/adaptation	GRI 3-3(c)	Evaluation of target deviations & corrective actions
	M3(a2)	Interim milestones	Changes in estimates & assumptions	GRI 3-3(c)	Sustainability-based incentives for management
M4(a1)	ESG remuneration	Climate target remuneration	GRI 2-19	Sustainability-Based Incentives	

Table 1. (Continued)

To assess disclosure maturity, this study adopts the five maturity levels of the Capability Maturity Model Integration (CMMI), as used ^[31]. As shown in Table 2, maturity levels range from *Initial* (ad hoc and narrative reporting) to *Optimized* (fully integrated, data-driven, and adaptive disclosure processes). The

CMMI framework provides a standardized lens to classify reporting practices without conflating disclosure quality with substantive policy performance.

Table 2. Maturity Level

Score (%)	Level	Maturity Level	Description
0% – 20	1	Initial	Reporting is ad hoc and reactive. There is no governance structure, no formal metrics, and the content is descriptive, lacking a transparent methodology dependence on individual initiatives rather than institutional ones.
21% – 40	2	Managed	Reporting has a basic documented process, but it is still limited. Indicators are incomplete, mostly narrative, and inconsistent between years. Data collection is not yet systematic and is not linked to risk management processes or strategy.
41% – 60%	3	Defined	The reporting process has been standardized and documented as an organizational practice. Quantitative metrics are being used, the governance structure is more transparent, and initial integration with strategic planning is emerging, although it is not yet quantitatively measurable.
61% – 80%	4	Measured	Reporting consistently uses metrics and quantitative data. Risk and target evaluations are becoming measurable. Monitoring is conducted using a data-driven approach, although it has not yet been fully optimized across functions.
81% – 100%	5	Optimized	Disclosure has become a mature and adaptive process. All pillars of IFRS–GRI are integrated. The process is data-driven, with clear quantitative targets, regular evaluations, continuous improvement, and cross-stakeholder feedback mechanisms.

Sources: Adopted from *Capability Maturity Model Integration (1987)*

Having established the PSSDI framework and its indicator structure, the analysis now turns to its pilot application across selected public institutions in four Asian jurisdictions. This comparative analysis is intended to illustrate how the proposed hybrid IFRS–GRI indicators function in different public governance contexts and to identify indicative patterns of disclosure maturity, rather than to produce definitive national rankings or generalizable cross-country performance assessments.

3.2. Cross-Country Comparative Analysis

All PSSDI indicators were equally weighted, reflecting the exploratory objective of mapping disclosure breadth and structural completeness rather than prioritizing specific policy dimensions. Composite disclosure scores were calculated as the proportion of indicators disclosed relative to the total number of indicators. No sensitivity analysis using alternative weighting schemes was conducted and this is acknowledged as a limitation of the study.

The application of the PSSDI framework to seven public-sector sustainability reports from Singapore, Hong Kong, Malaysia, and Indonesia reveals substantial variation in disclosure depth and maturity. Composite disclosure scores ranged from 9% to 89%, indicating a wide gradient of institutional adaptation to global sustainability reporting norms (Figure 3).

These results should be interpreted as an **illustrative and exploratory application** of the PSSDI rather than a definitive cross-country ranking of sustainability performance. Given the limited and heterogeneous sample of institutions, the analysis demonstrates how the hybrid IFRS–GRI indicators function across governance contexts, rather than producing statistically generalizable national comparisons. Accordingly, the findings are best understood as indicative patterns of disclosure maturity associated with differing stages of institutionalization.

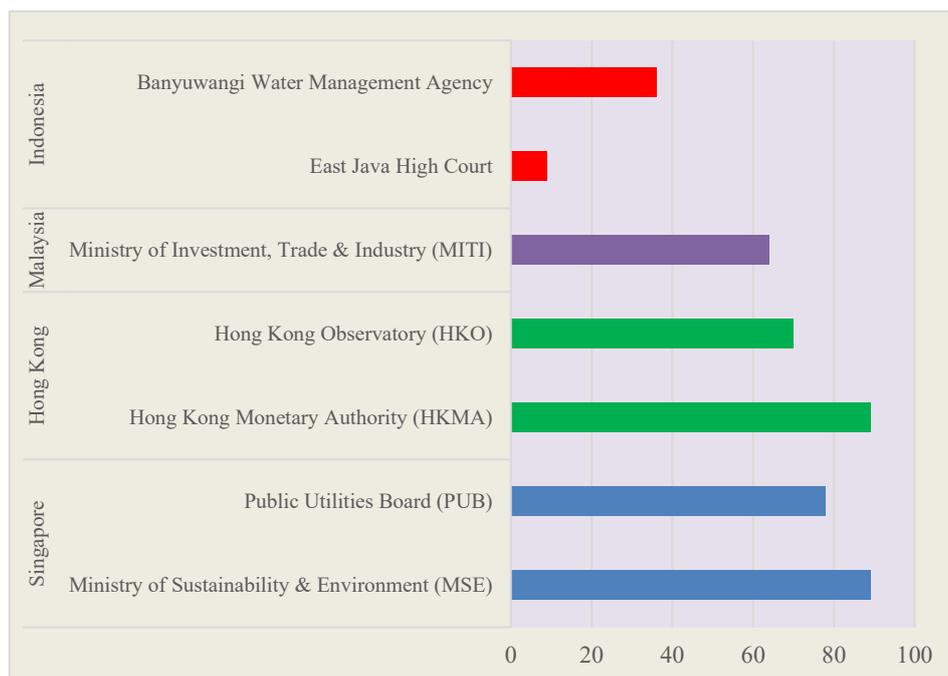


Figure 3. Cross-Country Composite Scores

Based on composite scores and maturity classifications, three broad disclosure tiers emerge:

Tier 1 – Optimized (≥80%)

Cases in this tier exhibit the highest levels of sustainability disclosure maturity within the sample. Sustainability reporting is characterized by clearly defined governance mandates, strong inter-agency coordination, and the consistent use of quantitative metrics related to greenhouse gas emissions, energy efficiency, and climate-related risk management. Disclosure practices in these cases demonstrate close alignment between sustainability objectives and core public governance processes. This level of maturity coincides with the presence of cohesive national policy frameworks such as GreenGov.SG and long-term climate action strategies that embed sustainability considerations within fiscal oversight, strategic planning, and performance monitoring mechanisms.

Tier 2 – Measured (60–79%)

Cases classified within this tier reflect an intermediate level of disclosure maturity. Sustainability reporting shows growing integration of ESG considerations, particularly within selected sectoral ministries and agencies. However, disclosures remain uneven, with a predominance of descriptive narratives and limited linkage between risk assessment, quantified targets, and institutional accountability structures. The absence of mandatory, system-wide public-sector sustainability reporting standards constrains consistency and limits the depth of integration across government entities.

Tier 3 – Managed (<40%)

Cases in this tier represent an early stage of sustainability reporting development. The analyzed reports primarily emphasize narrative descriptions of environmental programs, compliance activities, and operational initiatives. Quantitative performance metrics, forward-looking risk assessments, and formalized sustainability governance arrangements are largely absent, indicating that sustainability reporting remains weakly institutionalized and largely detached from core planning and accountability processes.

Overall, the cross-case application of the PSSDI demonstrates that global sustainability disclosure frameworks are selectively interpreted and adapted within public governance systems. Higher disclosure

scores reflect more structured and systematized reporting practices, but do not necessarily indicate superior sustainability outcomes or policy effectiveness. These findings underscore the importance of distinguishing between symbolic and substantive disclosure, reinforcing the role of the PSSDI as a diagnostic tool for assessing reporting maturity rather than a direct measure of governance performance.

4. Discussion

The cross-country findings advance the study's objective of assessing public-sector sustainability reporting maturity across Asian jurisdictions and demonstrate how the proposed IFRS–GRI hybrid model captures substantive variation in disclosure practices. Rather than merely reflecting differences in sustainability performance, the observed score distribution reveals varying degrees of institutionalization, policy integration, and disclosure discipline embedded within public governance systems. In more advanced jurisdictions such as Singapore and Hong Kong, sustainability reporting has evolved into a routinized governance mechanism, supported by cross-ministerial coordination, standardized quantitative indicators, and explicit linkages between fiscal oversight and environmental risk management. In these contexts, alignment with IFRS S1/S2 and GRI Standards is not symbolic; it is embedded within regulatory mandates, national policy strategies, and enabling data infrastructures.

Malaysia represents a transitional configuration in which sustainability awareness and ESG-related policy commitments are increasingly articulated, yet disclosure practices remain uneven across sectors and agencies. While selected elements of the IFRS–GRI logic are adopted, inconsistencies in metrics, limited integration with formal risk management processes, and the absence of uniform reporting obligations constrain the depth and comparability of disclosures. Indonesia, by contrast, remains at an early stage of reporting maturity. Sustainability disclosures among the sampled institutions are predominantly narrative and program-oriented, with limited reliance on measurable targets, financial linkages, or formal governance mechanisms. This pattern reflects not only capacity limitations, but also the continued dominance of activity-based accountability over outcome- and risk-oriented disclosure frameworks in public administration.

Taken together, these variations indicate that public-sector sustainability reporting maturity is shaped by three interrelated structural conditions: regulatory embedment, organizational capacity, and data infrastructure readiness. Jurisdictions characterized by clear regulatory mandates, technical expertise, and integrated information systems are better positioned to translate global sustainability standards into consistent and policy-relevant disclosure practices ^{[17], [32], [33]}. Conversely, voluntary regimes and fragmented institutional arrangements tend to generate selective or symbolic reporting, thereby limiting comparability and reducing the governance utility of sustainability information ^{[34], [35]}. These findings reinforce prior public governance literature, which emphasizes the central role of regulatory coherence and institutional capacity in shaping disclosure quality.

Beyond regulatory strength and technical capacity, the findings also underscore the importance of contextual alignment in shaping the legitimacy of public-sector sustainability reporting frameworks. In jurisdictions where reporting frameworks are adapted to domestic administrative traditions, policy priorities, and accountability mechanisms, sustainability reporting tends to be more deeply embedded, even when disclosure remains voluntary. This suggests that legitimacy in public-sector sustainability reporting does not arise solely from formal compliance with global standards, but also from perceived relevance and usability within domestic governance systems. By contrast, the uncritical adoption of globally recognized frameworks without sufficient contextual adaptation may result in symbolic conformity rather than substantive governance integration.

Higher PSSDI scores do not necessarily indicate better governance outcomes or sustainability performance. However, they do serve as indicators of disclosure practices that may reflect strategic responses to normative pressures and legitimacy concerns within the public sector.

From a theoretical standpoint, these empirical patterns reaffirm the relevance of institutional, legitimacy, and stakeholder perspectives in explaining the dynamics of public-sector sustainability reporting. Jurisdictions exhibiting higher reporting maturity demonstrate greater responsiveness to diverse stakeholder information needs, including those of citizens, policymakers, oversight bodies, and international actors. Legitimacy theory helps explain why standardized reporting formats are adopted to maintain credibility and international standing, even when implementation depth varies. Institutional theory further clarifies that Singapore and Hong Kong reflect a more advanced stage of coercive–normative integration. In contrast, Malaysia and Indonesia remain closer to mimetic adoption, selectively emulating global practices without comprehensive structural transformation. This tiered maturity pattern highlights the analytical value of the IFRS–GRI hybrid model in capturing the evolutionary dynamics of public-sector sustainability disclosure.

Theoretical Implications of the PSSDI Framework

This study advances understanding by demonstrating how the PSSDI framework operationalizes institutional, legitimacy, and stakeholder theories, providing a structured measurement tool that validates the study’s focus on sustainability reporting maturity across Asian jurisdictions.

From an institutional theory perspective, the PSSDI illustrates how coercive, normative, and mimetic pressures associated with IFRS S1/S2 and GRI Standards are mediated by national governance arrangements. The observed cross-country variation provides empirical support for the argument that global sustainability frameworks are not uniformly adopted in the public sector, but are selectively adapted according to regulatory mandates, administrative capacity, and data readiness ^{[36], [37]}. This extends institutional theory by highlighting the conditional and context-dependent nature of standard adoption in non-market environments.

In relation to legitimacy theory, the PSSDI offers an evaluative mechanism for distinguishing between symbolic and substantive sustainability disclosure. By emphasizing governance integration, risk management processes, and quantitative indicators, the framework moves beyond narrative assessments to capture the depth of institutional commitment embedded in reporting practices. The findings suggest that public-sector sustainability reporting functions not only as an accountability instrument, but also as a legitimacy strategy through which governments negotiate credibility and alignment with global norms ^{[38], [39]}.

This study further refines legitimacy theory by demonstrating that, within public-sector sustainability reporting, legitimacy does not derive exclusively from adherence to globally codified standards. Instead, legitimacy may also emerge from locally grounded reporting practices that align with national governance logics, administrative capacity, and policy priorities ^{[39], [40], [41], [42]}. In contexts where global frameworks such as IFRS S1/S2 and GRI are perceived as externally imposed or technically demanding, partial or adapted adoption may generate greater practical legitimacy than formal compliance that is only weakly internalized ^[12].

Accordingly, legitimacy in public-sector sustainability reporting should be understood as relational and context-dependent rather than purely rule-based. From a stakeholder theory perspective, the hybrid IFRS–GRI approach reflects the multiplicity of public-sector stakeholders and the dual accountability faced by governments. By integrating financial materiality with impact materiality, the PSSDI captures disclosure obligations that extend beyond capital providers to encompass societal, environmental, and policy outcomes. This operationalization advances stakeholder theory by demonstrating how disclosure frameworks can accommodate heterogeneous stakeholder demands within non-market governance systems.

Overall, the PSSDI framework bridges governance theory and measurement practice by illustrating that sustainability reporting in the public sector is neither a purely technical exercise nor a symbolic ritual. Instead, it constitutes a dynamic governance mechanism through which states respond to institutional pressures, build legitimacy, and engage stakeholders to pursue policy coherence and public accountability. These insights position the PSSDI as both a theoretical contribution and a practical analytical tool for understanding the evolution of sustainability reporting in Asian public governance.

5. Conclusion

This study developed and piloted the Public Sector Sustainability Disclosure Index (PSSDI), a hybrid measurement framework integrating IFRS S1/S2 and GRI Standards to assess compliance and disclosure coverage in public-sector sustainability reporting in selected Asian jurisdictions. The empirical application demonstrates substantial variation in reporting maturity, ranging from narrative and program-based disclosures in Indonesia to more institutionalized, metric-driven practices in Singapore and Hong Kong. These differences indicate that sustainability reporting maturity in the public sector is shaped not only by formal regulatory mandates but also by institutional capacity, data readiness, stakeholder engagement mechanisms, and the degree to which legitimacy-seeking behavior is embedded within governance systems.

From a theoretical perspective, this study contributes by operationalizing institutional, legitimacy, and stakeholder theories through a structured disclosure measurement framework. Rather than treating these theories as abstract explanatory lenses, the IFRS–GRI hybrid model translates core theoretical concepts such as institutional pressure, legitimacy strategies, and stakeholder accountability into observable indicators and maturity levels. The findings illustrate how governments at different stages of institutionalization selectively adapt global reporting standards, thereby extending existing theory on sustainability disclosure into the public-sector governance context, particularly within Asian administrative systems.

Practically, the study offers relevant implications for Indonesia and other Asian countries facing similar institutional and regulatory conditions. In the Indonesian context, the PSSDI framework may serve as a foundational reference for developing a National Sustainability Reporting Measurement Index for government entities, complementing existing performance accountability instruments. Integrating sustainability-related indicators into fiscal management and performance evaluation systems could enhance the government's capacity to monitor climate-related commitments, assess policy impacts, and align public programs with SDG 13 objectives. At the regional level, the PSSDI provides a flexible and comparable template for jurisdictions seeking to strengthen the credibility, transparency, and consistency of public-sector sustainability disclosure without imposing a purely corporate reporting logic.

Several limitations of this study should be acknowledged. First, cross-country comparability remains constrained by heterogeneity in institutional mandates, reporting formats, and data availability. The selected public institutions differ in scale, function, and reporting maturity, which limits direct benchmarking across cases. Second, reliance on publicly available sustainability and annual reports may underrepresent internal governance practices or performance data that are not disclosed, potentially leading to conservative assessments of institutional capacity. Third, while expert validation through focus group discussions enhances conceptual robustness, the limited number of experts per country restricts the generalizability of validation outcomes.

These limitations are inherent to the exploratory and pilot nature of the study, which was designed to test the feasibility, interpretability, and adaptability of the PSSDI framework rather than to produce statistically representative national rankings. The selection of one to two institutions per country was therefore intentional and appropriate for examining how the proposed indicators function across diverse public-sector contexts and governance arrangements.

Future research can build on this study in several ways. Longitudinal applications of the PSSDI could examine how sustainability reporting maturity evolves in response to regulatory change or institutional learning. Expanding the sample across different levels of government, involving central, provincial, and local, would provide deeper insight into mechanisms of institutional diffusion and capacity development. Further refinement could also integrate quantitative fiscal or budgetary data on sustainability initiatives, thereby strengthening the linkage between disclosure practices and public value creation.

Finally, higher disclosure scores should not be interpreted as definitive evidence of superior governance performance. Consistent with institutional and legitimacy theories, enhanced disclosure may reflect strategic alignment with global norms rather than substantive policy effectiveness. Nevertheless, by providing a structured and theoretically grounded measurement framework, the PSSDI offers a valuable analytical tool for assessing how sustainability reporting functions as a governance mechanism in the public sector. In doing so, this study contributes to ongoing efforts to move sustainability reporting beyond procedural compliance toward a more meaningful instrument of accountability and policy coherence in Asia.

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Conflict of interest

The authors declare no conflict of interest.

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