JeDEM 18(2): 192-223, 2026
ISSN 2075-9517
http://www.jedem.org
Date of submission: 19.05.2026
Date of acceptance: 01.10.2026
Article DOI: 10.29379/jedem.v18i2.1280

AI Adoption in the Association of Southeast Asian Nations' Higher Education as a Digital Governance Challenge: A Preliminary Scoping Review

Dhita Widya Putri

ORCID Nr: 0009-0007-8028-6748
University of Debrecen, Institute of Applied Economics, Doctoral School of Management and Business, Faculty of Economics and Business, Debrecen, Böszörményi út 138, 4032, Hungary
widya.putri.dhita@econ.unideb.hu (Corresponding Author 1)

Budi Riyanto

ORCID Nr: 0000-0001-6330-0308
LSPR Institute of Communication and Business, Jl. K.H. Mas Mansyur No.Kav. 35, RT.12/RW.11, Karet Tengsin, Kecamatan Tanah Abang, Kota Jakarta Pusat, Daerah Khusus Ibukota Jakarta 10220, Indonesia
budi.r@lspr.edu

Dendy Muris

ORCID Nr: 0000-0001-5767-3087
LSPR Institute of Communication and Business, Jl. K.H. Mas Mansyur No.Kav. 35, RT.12/RW.11, Karet Tengsin, Kecamatan Tanah Abang, Kota Jakarta Pusat, Daerah Khusus Ibukota Jakarta 10220, Indonesia
dendy.m@lspr.edu (Corresponding Author 2)

Sun Xinyuan

ORCID Nr: 0009-0005-9381-2167
University of Debrecen, Institute of Applied Economics, Doctoral School of Management and Business, Faculty of Economics and Business, Debrecen, Böszörményi út 138, 4032, Hungary
sun.xinyuan@econ.unideb.hu

Chen Hantang

ORCID Nr: 0009-0008-7998-6701
University of Debrecen, Institute of Applied Economics, Doctoral School of Management and Business, Faculty of Economics and Business, Debrecen, Böszörményi út 138, 4032, Hungary

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

chen.hantang@econ.unideb.hu

Yin Yucui

ORCID Nr: 0009-0000-4049-2570
University of Debrecen, Institute of Applied Economics, Doctoral School of Management and Business, Faculty of Economics and Business, Debrecen, Böszörményi út 138, 4032, Hungary
yin.yucui@econ.unideb.hu

Adrián Szilárd Nagy

ORCID Nr: 0000-0002-3813-9759
University of Debrecen, Institute of Applied Economics, Faculty of Economics and Business, Debrecen, Böszörményi út 138, 4032, Hungary
nagy.adrian@unideb.hu

Abstract: *Between 2022 and 2025, the Association of Southeast Asian Nations (ASEAN) governments and regional bodies issued more artificial intelligence (AI) policy for higher education (HE) than the indexed empirical literature produced to evaluate it. This preliminary scoping review treats policy-evidence asymmetry not as an educational-technology problem but as a digital-governance problem, asking how policy ambition, institutional governance capacity and educational-informatics infrastructure interact as one interdependent socio-technical system. Following Arksey and O'Malley (2005), refined by Levac et al. (2010), and reported under PRISMA-ScR, ten records were charted: three indexed empirical studies, two peer-reviewed comparators and five apex policy instruments. The review offers an evidence map documenting the asymmetry as an emerging governance pattern; the Policy-Governance-Informatics (PGI) framework and its falsifiable weakest-layer-binds proposition; and a governance-focused research agenda specifying theoretical, methodological and stakeholder gaps, with academic and practical implications.*

Keywords: *AI governance, HE, ASEAN, digital governance capacity, scoping review*

Acknowledgement: *The authors received no funding for this study and declare no competing interests.*

Statement on the use of AI: *During the preparation of this work, the authors used Grammarly in order to support language editing, grammar, readability, and consistency of academic style. No AI tool was used to search, screen, chart, code, or interpret the records analysed. After using this tool/service, the authors reviewed and edited the content as needed and take full responsibility for the content of the published article.*

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

1. Introduction

Between 2022 and 2025, the ten member states of the Association of Southeast Asian Nations (ASEAN) and the regional secretariat issued artificial intelligence (AI) governance instruments naming higher education (HE) as a primary implementation site faster than indexed empirical scholarship examining AI adoption inside ASEAN HE accumulated. The ASEAN Guide on AI Governance and Ethics and its generative AI expansion (ASEAN Secretariat, 2024a, 2024b), the ASEAN Responsible AI Roadmap 2025-2030 (2025), and national AI strategies designating HE as a talent-formation and ethics-testing site all appeared within a three-year window, while indexed empirical studies directly examining AI adoption in ASEAN HE remain few (Buragohain & Chaudhary, 2025; Chakamanont et al., 2025; Song & Ding, 2025).

Read as an educational-technology problem, this is unremarkable: new technologies routinely outpace the scholarship that evaluates them. Read as a digital-governance problem, it is diagnostic. The problem this review states is, therefore, not how AI is being used in ASEAN universities but what it indicates about a region's digital-governance capacity when the production of policy systematically outruns the evidence infrastructure required to steer, implement and evaluate that policy. Posed this way, the asymmetry becomes a symptom to be read, and the object of analysis shifts from classroom practice to the institutional apparatus through which regional principles must reach it.

The asymmetry is not a gap between two independent stocks growing at different rates but a property of a single interdependent socio-technical system. Policy instruments acquire educational effect only through governance arrangements that translate them into institutional rules, and only through educational-informatics capacity that enacts those rules in teaching, assessment and data infrastructure; evidence production is itself an element of that system. Treating policy, governance and informatics as parallel domains, which is how the literature is currently organised, therefore, renders the very interdependence that generates the asymmetry analytically invisible.

ASEAN is a particularly informative site for this question, for three documented reasons. First, the region already exhibits the interlocking digital-governance constraints that digital-government scholarship identifies as decisive. Liu and Khalid (2025), show that the digital divide, cybersecurity and institutional trust operate as interconnected determinants of digital-governance effectiveness, that connectivity alone does not deliver effective participation where proficiency is uneven or users doubt platform security, and that legal and administrative systems struggle to keep pace with rapidly evolving technologies, so instruments deployed without regulatory grounding invite disputes and reduced legitimacy; the digital divide, digital illiteracy and limited government capacity are, likewise, identified among the unintended consequences of the public-sector digital transition (Wimmer et al., 2020). Second, ASEAN's capacity distribution is unusually heterogeneous, ranging from among the most digitally advanced administrations in the world to systems still building foundational capability (Chheang et al., 2023; World Bank, 2024). Where capacity is uniform, its average is an adequate summary; where it is dispersed, the distribution itself, and specifically its minimum, becomes the interesting variable. Third, the region's governance tradition is consensus-based and non-binding, so regional principles must be carried into practice by national and institutional instru-

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

ments whose strength varies, and higher education is not a neutral delivery channel for such principles but a governance arena in its own right, with its own decision-making cultures, autonomy regimes and resistances (Bohman et al., 2014).

Against this background, the research gap is specific. The literature on AI policy and adoption in HE is expanding quickly, but along three tracks that rarely meet: a critical-discursive track examining how AI is constructed in HE discourse (Bearman et al., 2023); a multidisciplinary track mapping the opportunities, challenges and policy implications of generative AI (Dwivedi et al., 2023; Hughes et al., 2025); and a bibliometric track charting the field's growth and thematic composition (Bahroun et al., 2023). These describe the global field with increasing precision, yet four things remain undone. There is no region-specific evidence map for ASEAN HE. AI in HE is predominantly framed as an educational-technology object, so the institutional layer through which policy must pass is underexamined. No integrative lens connects national policy, regional and institutional governance, and educational informatics as one system. And the disconnect between what is prescribed and what is evidenced is treated as background noise, although parallel fields show it to be analysable in its own right (Bohman et al., 2014; Saladie et al., 2025). This review addresses these four omissions together.

Scoping reviews are the appropriate response to these conditions. As Arksey and O'Malley (2005) argued, and Levac et al. (2010), Munn et al. (2018), and Mak and Thomas (2022), refined, they suit literatures that are heterogeneous, conceptually uncharted and policy-relevant, and they are equally appropriate when the small size of an indexed evidence base is itself a finding. Given the yield reported in Section 3, this review is presented deliberately as a preliminary, exploratory scoping review producing an evidence map rather than a comprehensive review of a mature literature. That designation is a design decision, not a disclaimer, and it calibrates every claim that follows.

Three contributions are offered, each stated at the level of confidence the data set supports. First, the review documents the policy-evidence asymmetry and argues that it is best read as an emerging regional governance pattern rather than a purely transitional maturation lag, a preliminary indication for which Section 5.2 specifies the confirming and refuting evidence. Second, it proposes the Policy-Governance-Informatics (PGI) framework as an integrative lens treating the three layers as one interdependent socio-technical system, and articulates one falsifiable proposition that future empirical work can test. Third, it identifies the theoretical, methodological and stakeholder gaps a governance-focused research agenda should address, and derives academic and practical implications from them. Figure 1, presents the framework.

The review addresses three research questions:

RQ1. What are the characteristics of the charted data set in terms of year, geographic coverage, source type and methodology, and how is AI adoption in ASEAN HE characterised across the policy, governance and educational-informatics layers of the PGI framework?

RQ2. What barriers and enablers to ethical and equitable AI integration across the three PGI layers are reported in the data set, and how do they interact?

RQ3. What theoretical frameworks have been used to analyse AI adoption in ASEAN HE, and what conceptual gap does the PGI framework address?

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

2. Conceptual Framework: Policy, Governance and Informatics

2.1. Three traditions and what each leaves unspecified

PGI is assembled deductively from three traditions, each supplying a necessary premise and each stopping short of the claim the framework needs. Socio-technical systems thinking establishes that technological and institutional elements co-evolve and cannot be optimised independently, but not how capacity asymmetries between coupled subsystems determine system output. Multi-level governance establishes that authority over digital policy is distributed across regional, national and institutional levels, but is largely silent about levels whose implementation capacity differs sharply. Policy-implementation and policy-network research (Howlett, 2002) documents that strategies under-deliver, but treats the gap as a property of a single policy system, leaving the layered, regionally governed case unaddressed.

Two bodies of digital-government scholarship supply the framework's empirical warrant. Wimmer et al. (2020), consolidated expert-elicited needs for disruptive technologies in the public sector into six research needs, spanning standardisation and interoperability, stakeholder engagement, evaluation and policy making, data security and privacy, automated decision-making and ethics, and five training needs, ranging from technology skills to legal compliance and responsible research. The salient point for PGI is structural: these needs do not cluster in a single register but are simultaneously technical, legal, managerial and ethical, which is what one would expect if capability in public-sector AI were distributed across coupled layers.

Bohman et al. (2014), supply complementary evidence from inside higher education. Their mixed-methods evaluation of an EU e-participation project across thirteen universities attributes the initiative's disappointing outcomes not to the technology but to weak project design, an excessive focus on tools at the expense of contextual factors, institutional resistance, low management commitment, language barriers and low trust. Their framework treats external contextual factors, including regime type, decision-making and working cultures, the legal and policy environment, institutional autonomy and the socioeconomic environment, as drivers of, or barriers to, embedding an intervention, and identifies three modes of transformation failure: an intervention logic that is not plausible, realistic or internally consistent; an intervention logic misaligned with external factors; and an unanticipated barrier. PGI can be read as an attempt to locate, for the AI-in-HE case, where in a layered system each failure mode is generated.

2.2. The three layers

The Policy layer (P), comprises national AI strategies and their HE-specific targets, inter-ministerial coordination, talent-pipeline commitments, and the alignment between stated strategy, funded implementation and actual institutional capacity. The Governance layer (G), comprises regional normative instruments, national and institutional AI-use policies, data-governance and academic-integrity regimes, and the adaptation of quality-assurance and accreditation frameworks: the instruments through which principles become binding rules for organisations. The Informatics layer (I), comprises adaptive and generative learning applications, assessment and feedback systems, learning

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

analytics and learning-management infrastructure, computing and data architecture, localised language models, and the faculty capability that operates them.

The layers are defined so that each is a necessary conduit for the others: informatics investment without institutional AI-use policy produces uncoordinated local experimentation, and governance principles without policy-level resourcing produce declaratory compliance. The framework's ASEAN grounding lies in four commitments that distinguish it from imported models: consensus-based rather than binding regional governance; multilingual and multicultural HE systems in which the cultural and linguistic fit of AI tools is a first-order concern; heterogeneous policy maturity such that no single regional template fits all member states; and capacity-conditioned policy diffusion, in which adoption outcomes are bounded by implementation capacity rather than by policy ambition.

2.3. The weakest-layer-binds proposition: mechanism and scope conditions

The framework's central claim is that AI integration outcomes in ASEAN HE are bounded by the layer with the lowest implementation capacity rather than by the average or the strongest. Stated baldly this is intuitive; its theoretical force depends on specifying why the minimum binds and under what conditions. The mechanism is layer coupling under non-substitutable complementarity: because each layer is a necessary conduit for the others, capacity in a strong layer cannot be reallocated to compensate for a weak one, since a sophisticated national strategy cannot bypass the absence of quality-assurance carriers and well-resourced campus informatics cannot substitute for a missing institutional AI-use policy. Where inputs are complementary and non-substitutable in this way, system output is governed by the minimum rather than the mean. The proposition applies that limiting-factor logic to digital-governance capacity in higher education, and it is this mechanism that carries the framework's theoretical claim.

Two scope conditions bound the claim. First, it holds only where the layers are genuinely coupled, that is, where policy reaches practice exclusively through governance and informatics carriers; where institutions adopt AI autonomously and at scale outside national strategy, as well-endowed private providers operating beyond national quality-assurance regimes may do, the coupling weakens and the minimum no longer strictly binds. Second, it concerns system-level integration outcomes, meaning region-wide, equitable and institutionally embedded adoption, not isolated local success: individual institutions may achieve high local integration while the regional system remains bounded by its weakest members. So stated, the proposition is falsifiable: it is disconfirmed if member states or institutions with a single weak PGI layer achieve system-level outcomes comparable to those with uniformly high capacity, or if average-layer capacity predicts outcomes at least, as well as minimum-layer capacity, in a properly specified model. Section 5.6 sets out three designs that would test it.

2.4. The epistemic status of the framework

PGI is an a priori analytical framework, not an inductive output of this review, and the distinction matters for how the results should be read. The three layers were specified deductively from the

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

traditions summarised in Section 2.1 before any record was charted, and the charting form was structured by them, as Section 3.5 describes. Any claim that the framework emerged from the synthesis would misdescribe the procedure.

What the review contributes, given an a priori framework, is threefold and more modest than an inductive origin claim would be: it demonstrates that no charted record addresses all three layers integratively; it refines the proposition from a general intuition into a scope-conditioned, falsifiable statement; and it maps barriers and enablers onto layers and interfaces, producing a testable distribution.

An a priori framework can impose structure on evidence that does not warrant it and render invisible whatever it has no category for. Three mitigations were applied: the charting form retained an open field for unaccommodated content; a negative-case check was performed on that field; and layer assignments were reviewed in team discussion, with contested assignments recorded at the interface between layers instead of being forced into one. Section 3.5 reports the outcome.

Figure 1: The Policy-Governance-Informatics (PGI) framework as an ASEAN-grounded integrative lens for AI adoption in higher education

AI adoption in ASEAN higher education as an interdependent socio-technical governance system		
POLICY LAYER (P): national AI strategy	**GOVERNANCE LAYER (G): regional and institutional rules**	**INFORMATICS LAYER (I): educational tools and pedagogy**
National AI strategies and HE targets; inter-ministerial coordination; talent pipelines; strategy-implementation alignment; capacity-sensitive policy design	ASEAN Guide on AI Governance and Ethics; Responsible AI Roadmap; institutional AI-use policy; data governance and academic integrity; quality-assurance adaptation	Adaptive learning systems; generative AI in teaching and assessment; learning analytics and LMS; HPC and data infrastructure; localised language models
Coupled and non-substitutable: each layer is a necessary conduit for the others (Section 2.3)		
Weakest-layer-binds proposition: the layer with the lowest implementation capacity determines the ceiling of AI integration outcomes across the system		
ASEAN-grounded commitments: consensus-based regional governance; multilingual and multicultural HE systems; heterogeneous policy maturity; capacity-conditioned policy diffusion		

3. Methods

3.1. Design and rationale: a preliminary scoping review

The review followed the five-stage framework of Arksey and O'Malley (2005), namely, identifying the research question, identifying relevant studies, study selection, charting the data, and collating, summarising and reporting the results, with the enhancements recommended by Levac et al. (2010)

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

and Daudt et al. (2013), including clarification of purpose, iterative team-based selection and combined numerical and narrative analysis. Reporting was guided by the PRISMA Extension for Scoping Reviews (Tricco et al., 2018) and by the operational steps in Mak and Thomas (2022).

A scoping review was chosen over a systematic or narrative review for four reasons. First, the evidence base on AI adoption in ASEAN HE is recent, rapidly evolving and methodologically heterogeneous, mixing peer-reviewed empirical work with policy documents and institutional reports, which are precisely the conditions under which scoping reviews are recommended (Arksey & O'Malley, 2005; Munn et al., 2018), and under which they are used to map fields too differentiated for a systematic review (Shamsir et al., 2022). Second, the purpose is to map extent, range and nature rather than to synthesise effect estimates; the output is an evidence map (Bour et al., 2021). Third, and directly relevant to the size of the data set reported below, scoping reviews are undertaken where feasibility is at issue, and that condition is symmetrical: either the relevant literature is thought especially vast and diverse, or there is reason to suspect not enough of it exists (Saladie et al., 2025). The second condition obtains here, so the small indexed yield is one of the circumstances the method was designed to address. Fourth, scoping reviews permit rather than require the inclusion of grey literature alongside indexed scholarship, and such inclusion is particularly appropriate here, because the greater part of ASEAN's AI-governance evidence sits in policy instruments rather than indexed articles (Peters et al., 2020). A method excluding grey literature by design would render the asymmetry documented here invisible, since one side of it would never enter the data set.

One design decision requires emphasis at the outset. The indexed yield reported in Section 3.4 is small: three indexed empirical articles are sufficient to establish that the indexed evidence base is thin but not to establish a regional pattern, and five apex policy documents are sufficient to characterise the regional policy frame but not to support member-state comparison. This review is, therefore, designated a preliminary, exploratory scoping review producing an evidence map, and all region-level statements in Sections 4 and 5 are framed as preliminary indications and hypotheses for testing rather than as established regularities. A small final data set is not in itself anomalous in this literature: Saladie et al. (2025), screened more than 1,300 records to a final set of fourteen. What distinguishes the present case is that the attrition occurs at identification, not at screening, and it is that difference, and not the final number alone, that Section 4.2 treats as the finding. Section 3.8 states the consequences, and Section 5.6 specifies the wider data set as subsequent comprehensive review would require.

3.2. Stage 1: Identifying the research question

The three research questions were developed iteratively after a preliminary search of Scopus and Google Scholar in early 2025. That pilot confirmed three conditions: no prior scoping review had been published on AI adoption in ASEAN HE specifically; the available comparative literature was largely narrative; and the volume of accessible grey literature substantially exceeded the volume of indexed empirical research, which was the first signal of the asymmetry that became the review's central problem.

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

A consultation with a research librarian was undertaken at this stage, in line with Peters et al. (2020), and with the practice of comparable reviews, which report engaging a documentation specialist to settle search terms and test alternative search processes (Saladie et al., 2025). It served two distinct purposes. The first concerned design appropriateness: whether the anticipated volume and heterogeneity of literature could support a systematic review with formal quality appraisal, or whether a scoping design was required. The consultation supported the latter, on the explicit condition that the review be reported as preliminary and that the smallness of the indexed yield be treated as a reportable finding; the question was not broadened to obtain a larger data set, that condition is honoured throughout. The second concerned question calibration: the initial formulation, addressing AI in Southeast Asian education generally, was narrowed to a governance-focused question restricted to higher education, because the broader formulation would have produced a data set too heterogeneous to chart against a single framework.

3.3. Stage 2: Identifying relevant studies

Two classes of source were searched, and the distinction is analytically consequential. The first is the bibliographic index: a curated, field-searchable, exportable database of peer-reviewed literature. Scopus was selected as primary index for its multidisciplinary coverage of education, information systems and policy studies in the Asia-Pacific, and because scoping reviews addressing highly specific regional intersections are appropriately conducted on a single primary index supplemented by targeted grey-literature searching (Peters et al., 2020). A verification search of the Web of Science Core Collection using the same string returned no additional eligible records, itself an indication of a limited indexed evidence base.

The second class is the institutional document repository: the website of an organisation that publishes policy instruments and reports. Those searched were the ASEAN Secretariat, UNESCO including the Institute for Statistics and IESALC, the World Bank, the Asian Development Bank, ERIA and the ISEAS-Yusof Ishak Institute. These are not bibliographic databases and are not treated as such; they are the primary publishers of the documents sought, and regional guides, roadmaps and agency reports are by construction not deposited in Scopus or Web of Science. Retrieving them at source is, therefore, a different operation, directed at a different population of documents. Reference-list checking of all included records provided a third, citation-chaining route.

Google Scholar was used at the pilot stage for topic scoping and, after the main search, for a sensitivity check on the Scopus yield. It was not used as a primary retrieval database, for methodological reasons: it does not provide stable, versioned result sets, does not support controlled field-based syntax with reliable de-duplication, and does not permit complete, reproducible export of a numbered result set, so a search reported from it cannot be replicated with confidence. Its role was, therefore, to reduce the risk that the Scopus string had missed an obvious body of work; that check returned no eligible record absent from the data set. This is a trade-off, and should be reported as such. Shamsir et al. (2022), conducting a scoping review of higher-education pandemic preparedness, used Google Scholar and Google as primary search tools precisely because their coverage exceeds that of the subscription indexes, which is sound reasoning where breadth of retrieval binds. Here a different constraint bound: because the central claim of this review concerns the size of a

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

retrievable evidence base, the search had to be exactly reproducible, which the subscription index permits and the web search engine does not.

The librarian consultation also shaped the search strategy. Four contributions are recorded. First, it supported the selection of Scopus as primary index with Web of Science as verification rather than the reverse. Second, it informed construction of the Boolean string, in particular the decision to enumerate all ten member states alongside the regional labels, because country names rather than regional terms predominate in the relevant title, abstract and keyword fields. Alkathiri and Alharbi (2024), mapping a comparably region-defined literature, adopted the same device, pairing the regional term with each country name in turn; where a region is not a reliable indexing category, searching only for its name systematically under-retrieves the literature about it. Third, it settled truncation and phrase-search conventions. Fourth, it prompted an iterative refinement round in which, after the first pilot yield, the education block was widened from "higher education" alone to the truncated and alternative terms below.

The Scopus search was executed on 10 May 2025 in TITLE-ABS-KEY using: ("artificial intelligence" OR "generative AI" OR "machine learning" OR "large language model*" OR ChatGPT) AND ("higher education" OR universit* OR "tertiary education" OR "post-secondary") AND (ASEAN OR "Southeast Asia" OR Singapore OR Malaysia OR Indonesia OR Thailand OR Vietnam OR Philippines OR Brunei OR Cambodia OR Lao* OR Myanmar). The search was restricted to 1 January 2020 to 30 April 2025, and records in English or Bahasa Indonesia were eligible. Inclusion and exclusion criteria are set out in Table 1, and the sources searched with their respective yields are reported in Table 2.

Table 1: Inclusion and exclusion criteria for the scoping review

Criterion	Inclusion	Exclusion
Type of source	Peer-reviewed empirical articles, peer-reviewed reviews, Scopus-indexed conference papers, and policy or institutional reports issued by ASEAN, UNESCO, the World Bank, ADB, ERIA and ISEAS	Editorials, commentaries, blog posts, undergraduate theses and news articles without primary data
Topical focus	AI or generative AI adoption in HE within one or more ASEAN member states, addressing policy, governance, pedagogy or educational informatics	AI in K-12 or early-childhood settings; non-ASEAN AI studies without comparative ASEAN reference; industry-only studies without HE relevance
Geographic scope	At least one ASEAN member state is the empirical or policy site	Studies with no identifiable ASEAN focus
Time period	1 January 2020 to 30 April 2025	Before 2020, unless a foundational policy instrument is cited within the data set
Language	English or Bahasa Indonesia	Other languages without an English abstract

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

Table 2: Sources searched, source class, search approach and records retrieved

Source	Source class	Search approach	Records identified	Records included
Scopus	Bibliographic index	TITLE-ABS-KEY Boolean string, executed 10 May 2025	4	3
Web of Science Core Collection	Bibliographic index (verification)	Same string, verification search	0 additional	0
Google Scholar	Web search index (pilot and sensitivity check only)	Topic scoping, early 2025; post-hoc sensitivity check	Not counted as a retrieval source	0
ASEAN Secretariat	Institutional repository	Structured browsing of AI-governance publications	8 (combined)	3
UNESCO (incl. UIS, IESALC)	Institutional repository	Site search of AI-in-education guidance		1
World Bank	Institutional repository	Site search of digital development reports		1
Asian Development Bank	Institutional repository	Site search		0
ERIA	Institutional repository	Site search		0
ISEAS-Yusof Ishak Institute	Institutional research repository	Site search		0
Reference-list checking	Backward citation chaining of included records	Manual screening of reference lists	2	2
Total			14	10

3.4. Stage 3: Study selection

Records retrieved from Scopus were exported to a reference manager and screened for duplicates within the indexed stream and against the reference-list-checking yield. Grey-literature records were managed as a separate stream and were not expected to duplicate indexed records, because policy instruments issued by ASEAN, UNESCO and the World Bank are not deposited in the indexes searched; cross-stream checking was performed only to identify the exceptional case of a policy report also issued as an indexed publication, and no such case was found.

Screening proceeded in three phases. In calibration, two members of the research team independently screened a ten per cent pilot sample against a draft guide. The third team member adjudicated disagreements and diagnosed their source, so that the guide itself could be corrected. That

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

diagnosis produced three refinements: an operational rule for HE relevance, requiring higher education to be the empirical or policy site and not an incidental mention; a rule distinguishing regional-comparative studies including an ASEAN member state from studies with no identifiable ASEAN focus; and a rule treating industry- or economy-wide digital-readiness studies as adjacent context, excluded from the included records, which subsequently governed the treatment of Chheang et al. (2023). Round 1, applied the refined guide to titles and abstracts and Round 2, to full texts. Residual disagreements were resolved by discussion between the two screeners, and referred to the third team member only where discussion did not produce consensus, which is the escalation order recommended for scoping reviews (Bour et al., 2021; Tricco et al., 2018; Tschotschel et al., 2025). Following Mak and Thomas (2022), screening did not proceed to Round 1, until inter-rater agreement on the pilot sample reached at least ninety per cent. Agreement achieved on the pilot sample was achieved percentage agreement, reported separately for Round 1, and Round 2, from the screening log, and chance-corrected agreement was Cohen's kappa with its interpretation (Cohen, 1960).

The Scopus search returned four records, all in English, comprising two peer-reviewed articles and two conference papers. Three met the topical-focus criterion after full-text screening; the fourth (Chheang et al., 2023), was retained as adjacent contextual evidence under the rule described above and is excluded from the synthesis and from the counts in Table 4. Grey-literature screening yielded five policy and institutional documents (ASEAN Secretariat, 2024a, 2024b, 2025; UNESCO, 2023; World Bank, 2024), and reference-list checking identified two peer-reviewed comparators (Bahroun et al., 2023; Hughes et al., 2025). The final data set comprises of ten records, and the PRISMA-ScR flow, adapted from the PRISMA 2020 statement (Page et al., 2021), is summarised in Figure 2.

Figure 2: PRISMA-ScR flow of the study selection process

IDENTIFICATION	Records identified through Scopus (n = 4); Web of Science verification search (0 additional eligible records); institutional document repositories, comprising ASEAN, UNESCO, World Bank, ADB, ERIA and ISEAS (n = 8); reference-list checking (n = 2). Total identified: n = 14. Per-source detail is reported in Table 2.
SCREENING	Duplicate records removed (n = 1); records screened on title and abstract (n = 13); excluded at title and abstract (n = 2): no identifiable ASEAN focus (n = 1), K-12 setting (n = 1).
ELIGIBILITY	Full texts assessed for eligibility (n = 11); excluded at full text (n = 1): industry-wide rather than HE focus, retained as adjacent context only (Chheang et al., 2023).
INCLUSION	Included in the evidence map (n = 10): indexed empirical articles (n = 3); peer-reviewed comparators identified by reference-list checking (n = 2); grey-literature policy and institutional sources (n = 5).

3.5. Stage 4: Charting the data

A charting form was developed iteratively (Levac et al., 2010), piloted by two members of the research team on a ten per cent sample and revised before full application. It captured administrative variables, namely authors, year, country coverage, methodology or document type, and source type, and analytical variables aligned with the research questions and with the PGI framework: policy

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

and national-strategy content (P layer); governance and ethics content (G layer); educational-informatics applications and pedagogical implications (I layer); reported barriers and enablers, and the theoretical or conceptual framework used. Excerpts were entered verbatim where appropriate and supplemented with analytical notes, and weekly team meetings were used to limit interpretive drift.

Because the framework was specified a priori, the charting form was structured by it, which risks assimilating content to categories that do not fit. Combining a deductively specified scheme with provision for what it does not anticipate follows established practice: Celbis et al. (2025), chart a higher-education data set against a deductive scheme derived from their research questions, while Tschotschel et al. (2025), pilot a collaborative codebook, refine it in team meetings and retain open free-text categories. The form here, retained an open field for content none of the three layers accommodated. The negative-case check on that field returned no substantive body of content requiring a fourth layer or a redefinition of the three; residual entries concerned macroeconomic and labour-market context, which lies outside the framework's scope. This is reported as a check rather than as confirmation, since ten records are too few for it to be probative.

3.6. Stage 5: Collating, summarising and reporting

Analysis had two components. The first was a descriptive numerical analysis of the data set by year, geographic coverage, source type and methodology, reported in Table 4, and Section 4.1; this addresses the descriptive component of RQ1. The second was a framework-guided qualitative content analysis: charted excerpts were examined against each research question, labelled with codes summarising their content, and the codes assigned to a PGI layer or to an interface between layers. The coding logic of Braun and Clarke (2006), served as a procedural reference for familiarisation, coding and review of candidate themes, but the analysis is described as framework-guided content analysis rather than full reflexive thematic analysis, because ten records and an a priori framework do not satisfy the conditions reflexive thematic analysis assumes.

Table 3, reports the resulting coding framework, stating for each code an operational definition, the PGI layer or interface to which it was assigned, the kind of charted content it labels, and its relation to the other codes; without these, the mapping in Table 5, could not be independently assessed or extended. Patterns were reviewed and refined through team discussion, and where evidence was uneven across member states this is reported and not imputed. The optional sixth stage of the Arksey and O'Malley framework, stakeholder consultation, was not conducted. Omitting it is common and is usually a resource constraint (Bour et al., 2021); it is acknowledged as a limitation in Section 5.8 and proposed as the next step in Section 5.6.

Table 3: Coding framework, operational definitions and inter-code relations

Code	Operational definition	PGI layer	Typical charted content	Relation to other codes
C1 Strategic ambition	Statements setting national or regional AI targets for HE, including talent, literacy and research goals	P	National AI strategies; regional roadmap priorities	Upstream of C3; provides the object whose implementation C3 assesses

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

Code	Operational definition	PGI layer	Typical charted content	Relation to other codes
C2 Inter-ministerial coordination	Statements about which ministry or agency leads AI policy and how education authorities participate	P	Descriptions of lead-agency arrangements and coordination mechanisms	Conditions C3; low coordination is a reported cause of the C3 gap
C3 Strategy-implementation alignment	Statements comparing declared strategy with funded or operational enabling mechanisms	P-G	Reported gaps between targets and curriculum, incentive or QA instruments	Bridges C1/C2 to C4-C6; the principal P-G interface code
C4 Regional normative instrument	Statements of principle issued at regional or international level without binding force	G	Ethics principles, risk taxonomies, roadmap actions	Requires C5 and C6 to reach practice; not self-executing
C5 Institutional AI-use governance	Rules adopted at institution level governing permitted use, disclosure and integrity	G	Institutional AI-use policies; assessment and disclosure rules	Carrier of C4 into C8/C9; its absence is the reported break point
C6 QA adaptation	Adaptation of programme accreditation or QA criteria to address AI	G-I	Evidence, or reported absence, of QA-agency responses	Second carrier of C4; co-determines whether C4 binds practice
C7 Data and integrity risk	Statements about data protection, algorithmic bias, provenance and academic integrity risk	G	Privacy, bias, hallucination and IP concerns	Generates demand for C5 and C6; interacts with C8
C8 Pedagogical integration	Descriptions of AI use in teaching, learning, assessment and feedback	I	Adaptive learning, writing support, automated feedback, integrity-sensitive assessment design	Governed by C5/C6; enabled by C9 and C10
C9 Faculty capability	Statements about educator AI literacy, training, incentives and role definition	I	AI-literacy programmes; incentive structures; role framing of faculty	Necessary condition for C8; reported as frequently under-resourced
C10 Infrastructure and localisation	Statements about computing, data architecture, LMS integration and locally adapted or multilingual models	I	HPC and connectivity; LMS integration; localised language models	Enables C8; conditions equity outcomes recorded under C11
C11 Equity and divide	Statements about unequal access, affordability, literacy or language that differentiate who benefits	P-I	Connectivity, device and affordability gaps; digital and AI literacy; language and localisation gaps	Cross-cutting; interacts with C1, C9 and C10 and is the principal distributional code

3.7. Trustworthiness, reflexivity and reproducibility

Three measures support the transparency of the review. First, the search is reproducible: the Boolean string, execution date, date and language limits, inclusion and exclusion criteria, per-source yields and selection flow are reported above, and the charting matrix and coding book are available as supplementary material on request, so a reader who re-runs the string can verify the indexed yield

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

directly. Second, the analytical procedure is stated explicitly: the a priori status of the framework, the structure of the charting form, the negative-case check, the coding definitions in Table 3, and the interface-coding convention are specified, so the mapping in Section 4.4, can be independently assessed. Third, the limits of the procedure are stated at the point where they arise.

Two reflexive considerations bear on the interpretation. The author team's disciplinary composition, and its situation partly inside and partly outside the region, shaped the decision to frame AI adoption as a governance, rather than an educational-technology object; a team of learning scientists would plausibly have charted the same data set differently. And an a priori framework tends to find what it is designed to find; the mitigations in Section 2.4 reduce but do not eliminate that risk, which is a further reason for the preliminary designation.

3.8. Methodological limitations

Five limitations follow from the design. First, Scopus as the primary index, although justified by its Asia-Pacific coverage and verified against Web of Science, may have excluded work published in regional journals indexed in neither database; this risk was partly mitigated by reference-list checking and grey-literature searching, but not removed. Second, the language restriction to English and Bahasa Indonesia may have under-represented scholarship in Thai, Vietnamese, Khmer, Lao, Burmese, Filipino and Malay, which is a material limitation in a review that itself argues for the salience of linguistic plurality; Celbis et al. (2025), reach the same conclusion about their own English-only higher-education data set and identify regional and non-English-language coverage as a priority for subsequent reviews. Third, scoping reviews do not appraise study quality; what is presented is a chart of the conceptual terrain, not a synthesis of validated effects.

Fourth, and most consequentially, the data set is small in both streams, in different ways. The consequence for the indexed stream is stated in Section 3.1: no inference runs from three records to ten member states, and none is made. The five grey-literature documents are not a sample drawn from a larger population of comparable instruments but the apex regional and international instruments themselves. Purposive selection at the apex is defensible for characterising the regional policy frame, which is what Section 4.3 uses it for, and is not defensible for member-state comparison, which Section 4, accordingly does not attempt; a comprehensive treatment would require a national-level policy data set covering all ten states, specified as the first item of the agenda in Section 5.6. Fifth, no stakeholder consultation was conducted, so the perspectives of students, faculty, administrators and policymakers enter the review only as documents written by others represent them.

4. Results

4.1. Descriptive characterisation of the data set

Table 4, reports the descriptive characteristics of the ten charted records by year, source type, geographic coverage, methodology or document type, and the PGI layer or layers each principally addresses. Reporting whole-data set characteristics before thematic synthesis is standard in scoping

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

reviews and serves a distinct purpose, since the shape of a data set, in particular its temporal, geographic and methodological distribution, is itself evidence about the state of a field (Alkathiri & Alharbi, 2024; Tschotschel et al., 2025). Four features bear on the interpretation that follows.

Table 4: Descriptive characteristics of the ten charted records

Record	Year	Source type	Geographic coverage	Methodology or document type	Principal PGI layer(s)
Buragohain & Chaudhary	2025	Peer-reviewed indexed article	ASEAN, multi-country	Review with thematic analysis of news, university policies and journal papers	G, with I
Chakamanont et al.	2025	Peer-reviewed indexed article	Thailand, single institution	Institutional case study	I
Song & Ding	2025	Indexed conference paper	China-ASEAN	Comparative study of student and expert perspectives	G-P
Bahroun et al.	2023	Peer-reviewed comparator	Global	Bibliometric and content analysis	I, with G
Hughes et al.	2025	Peer-reviewed comparator	Global, multi-country	Analysis of interdependent generative AI adoption challenges	P, G and I
ASEAN Secretariat (2024a)	2024	Grey: regional policy instrument	ASEAN	Guide on AI governance and ethics	G
ASEAN Secretariat (2024b)	2024	Grey: regional policy instrument	ASEAN	Expanded guide on generative AI	G
ASEAN Secretariat (2025)	2025	Grey: regional roadmap	ASEAN	Responsible AI Roadmap 2025-2030	P-G
UNESCO (2023)	2023	Grey: international guidance	Global, applied regionally	Guidance for generative AI in education and research	G-I
World Bank (2024)	2024	Grey: international report	Global, with regional data	Digital progress and trends report	P-I

First, the data set is temporally compressed: all ten records appeared between 2023 and 2025 and six in 2024 or 2025, consistent with a field constituted by the public release of large generative models, and the reason the review can offer only a cross-sectional map. Second, source types are unevenly balanced in a specific direction: five of ten records are policy or institutional documents, against three indexed empirical studies and two peer-reviewed comparators drawn from the global rather than the ASEAN literature. Third, geographic coverage in the empirical stream is narrow: one record is a single-country institutional case study in Thailand and the remainder are multi-country or regional, so no indexed empirical record takes any of the other nine member states as its principal site. Fourth, methodological diversity is limited: the empirical stream comprises one review with

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

thematic analysis, one institutional case study and one comparative perspective study, with no longitudinal design, no multi-country comparative empirical design, and no study whose unit of analysis is the governance instrument itself.

Read against the coding framework, the layer distribution is equally uneven: the G layer is addressed principally by five records, the I layer by three, and the P layer principally by none, since policy content enters the data set as policy documents rather than as research about policy. Hughes et al. (2025), is the single record traversing all three layers, and it is a global study. This distribution is the descriptive basis for Section 4.3 and for the claim in Section 4.5 that the field currently treats the layers as parallel.

4.2. The policy-evidence asymmetry as a governance signal

The most striking pattern in the charted data set is not what the indexed empirical literature says about AI adoption in ASEAN HE but what it does not yet say. Across the three-year window in which generative AI reshaped higher education worldwide, the search returned three indexed empirical records addressing the topic directly, against five substantive policy and institutional documents from ASEAN, UNESCO and the World Bank.

A data set of this size carries further than a null finding, and, not as far as a demonstrated regional regularity. Two things follow directly. The indexed empirical evidence base on AI adoption in ASEAN HE, as retrievable through the principal multidisciplinary index on the stated date and terms, is very thin. Apex regional policy on the same subject is substantial, layered and recent. That is an observation about the evidence infrastructure available to steer implementation, and it holds whatever a fuller search of national policy would add, since further policy documents would widen the asymmetry. The strength, direction and member-state distribution of that asymmetry are not established here; each requires the wider data set specified in Section 5.6. The claim is accordingly framed as an emerging governance pattern.

Three observations sharpen the reading. First, the three indexed empirical records are each confined to a layer or a pair of layers. Buragohain and Chaudhary's review (2025), and thematic analysis of news coverage, university policies and journal papers is framed through socio-technical and ethical perspectives on generative AI in HE and is principally a G-layer contribution. Chakamanont et al.'s institutional case study (2025), at a leading Thai university advances a pedagogical argument for integration beyond automation and is principally an I-layer contribution. Song and Ding's comparison (2025), of student and expert perspectives on the use of generative AI in learning international politics traverses the G and P layers from an international-relations angle. No charted indexed empirical record addresses all three layers integratively.

Second, the policy data set is denser and more layered than the indexed empirical one: the two ASEAN guides operate at the G layer, the roadmap traverses P and G, UNESCO's guidance (2023), connects G and I, and the World Bank's report (2024), grounds P and I in macro-level evidence. The policy data set is already attempting to integrate across layers; the indexed empirical data set has not yet followed.

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

Third, the geographic distribution of the indexed evidence does not track that of policy ambition: empirical work concentrates on Thailand and on multi-country reviews, while member states that have produced substantive national policy are absent from the indexed stream. Uneven geographic distribution within a region-defined literature is not peculiar to this case. Scoping reviews in adjacent fields report the same shape: a predominance of research originating in and focused on high-income countries (Tschotschel et al., 2025), and an inconsistent distribution that leaves particular states conspicuously under-represented (Alkathiri & Alharbi, 2024). That such distributions recur is reason to treat the pattern as a candidate regularity worth testing, though not evidence that the ASEAN case shares their causes. Whether it reflects a temporary lag or a durable asymmetry in research capacity is examined in Section 5.2.

4.3. RQ1: Characterisation across the three PGI layers

4.3.1. Policy layer

Across the data set, AI adoption in ASEAN HE is consistently embedded in national AI strategies that treat higher education as a primary site of talent development and ethical experimentation. The member-state strategies synthesised in the Responsible AI Roadmap (ASEAN Secretariat, 2025), share emphases on AI literacy, talent pipelines, ethical governance and digital infrastructure, while Brunei Darussalam, Cambodia and Lao PDR appear at earlier phases, with AI integrated into broader digital-economy or education-sector plans rather than HE-specific instruments. Chheang et al.'s survey (2023), of Cambodian Industry 4.0 readiness, illustrative and not representative, reports the limited but growing capacity the roadmap associates with nascent HE-specific strategy.

Two structural observations matter. First, lead responsibility for AI typically sits with ministries of digital affairs, science or communications, while education ministries occupy secondary roles and quality-assurance agencies are rarely co-architects of national strategy; this division, coded C2, is reported as a source of coordination difficulty at implementation. Second, a recurring strategy-implementation gap is documented (Hughes et al., 2025; UNESCO, 2023): strategies articulate ambitious targets while enabling mechanisms, including faculty incentives, curriculum revision and quality-assurance instruments, lag behind. The P layer is, thus, where ambition most exceeds demonstrated capacity.

4.3.2. Governance layer

At regional level, the ASEAN Guide on AI Governance and Ethics (ASEAN Secretariat, 2024a) and its generative AI expansion (2024b) are the principal normative instruments, articulating principles of transparency, fairness, security, robustness, human-centricity and privacy and, in the expansion, the risks of disinformation, intellectual-property infringement, embedded bias and privacy breach; the Responsible AI Roadmap (2025), translates these into prioritised actions. Song and Ding (2025), examine how China-ASEAN AI cooperation, filtered through HE curricula, shapes perceptions of regional governance, consistent with Battista and Rivas-de-Roca's argument (2025), that integrating AI into public institutions reconfigures accountability and legitimacy.

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

The defining limitation of the G layer is that ASEAN's governance tradition is consensus-based and non-binding, which permits flexibility but constrains harmonisation. The effectiveness of regional frameworks, therefore, depends on national uptake and on institutional capacity to translate principles into operational rules for assessment, data governance and staff conduct (Buragohain & Chaudhary, 2025; Hughes et al., 2025; UNESCO, 2023). The charted evidence is notably sparse on how quality-assurance agencies have adapted accreditation frameworks to address AI (C6), and that sparsity is itself informative, because governance instruments without institutional carriers have no mechanism by which to bind practice.

4.3.3. Informatics layer

The educational-informatics material is dominated by accounts of generative AI use among students and faculty: intelligent tutoring and adaptive learning, AI-assisted writing and research support, automated assessment and feedback, learning analytics and administrative automation. Reported benefits cluster around personalised learning, productivity gains and improved support for students whose first language is not English (Hughes et al., 2025; UNESCO, 2023). Chakamanont et al. (2025), argue for designs in which generative AI augments rather than substitutes for academic judgement, and Buragohain and Chaudhary (2025), identify pedagogical recalibration alongside data privacy and algorithmic bias as core concerns.

A second body of content concerns infrastructure: high-performance computing, integration of generative tools with learning-management systems and locally trained language models appear as enablers, while weak campus connectivity, fragmented data architectures and inconsistent procurement appear as constraints. A recurring concern is the redefinition of educators' roles: faculty are positioned as users, designers or integrity gatekeepers, but rarely as co-researchers of pedagogical change, and where they are treated as reflective practitioners with time, training and incentives to redesign assessment (Chakamanont et al., 2025), reported benefits are higher. The I layer is where the asymmetry between practice and evidence is most acute.

4.4. RQ2: Barriers, enablers and their distribution across layers

Across the data set, six interrelated barriers and four classes of enabler recur, and Table 5, maps them to the layers and interfaces defined in Table 3. The barriers are the multidimensional digital, literacy and language divide; ethical and academic-integrity risk intensified by generative AI; shortages of AI-skilled human capital, including faculty capability; the strategy-implementation gap; regulatory and data-governance fragmentation; and institutional inertia rooted in incentive structures and pedagogical cultures. These correspond closely to the concerns identified by Buragohain and Chaudhary (2025), and to the interdependent adoption challenges reported by Hughes et al. (2025), and are consistent with Liu and Khalid's finding (2025), that the divide, cybersecurity and trust operate as interconnected constraints.

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

Table 5: Barriers and enablers to AI adoption in ASEAN higher education mapped to the PGI layers

Category	Layer	Theme	Illustrative content reported in the data set	Code
Barrier	P-I	Multidimensional digital, literacy and language divide	Inequities in connectivity, device access, affordability of paid tools, digital and AI literacy, and availability of tools in national and minority languages (ASEAN Secretariat, 2025; Chheang et al., 2023; Liu & Khalid, 2025)	C11
Barrier	G	Academic integrity and ethical risk	Difficulty of detecting generative AI use, data privacy, algorithmic bias, hallucinated content, intellectual-property concerns (Buragohain & Chaudhary, 2025; Hughes et al., 2025)	C7
Barrier	I	Human-capital and faculty-capability shortages	Insufficient supply of AI specialists; gaps in educator AI literacy; uneven faculty preparedness (ASEAN Secretariat, 2025; Chakamanont et al., 2025)	C9
Barrier	P-G	Strategy-implementation gap	Misalignment between ambitious strategy and institutional capacity for curriculum reform, assessment redesign and infrastructure investment (Hughes et al., 2025; UNESCO, 2023)	C3
Barrier	G	Regulatory and governance fragmentation	Incomplete data-governance regimes; no binding regional rules; limited institutional AI-use policy; sparse QA adaptation (ASEAN Secretariat, 2024a, 2024b)	C5, C6
Barrier	I	Institutional inertia	Reward systems prioritising research output over pedagogical innovation; reluctance to redesign assessment; weak change leadership (Bahroun et al., 2023; Bohman et al., 2014; Hughes et al., 2025)	C9
Enabler	P-G	Coordinated multi-stakeholder networks	Government, university and industry partnerships; participation of UNESCO, ADB and the World Bank in capacity building (ASEAN Secretariat, 2025; Song & Ding, 2025)	C2, C3
Enabler	I	Faculty-centred professional development	Sustained AI-literacy programmes; incentives for pedagogical innovation; communities of practice (Chakamanont et al., 2025)	C9

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

Category	Layer	Theme	Illustrative content reported in the data set	Code
Enabler	I	Contextualised tools and content	Locally trained language models; culturally adapted applications; open educational tools (Buragohain & Chaudhary, 2025)	C10
Enabler	G-I	Transparent institutional governance	Clear institutional AI-use policy; authentic and process-oriented assessment; AI literacy embedded in curricula (Buragohain & Chaudhary, 2025; Hughes et al., 2025)	C5, C8

Two features matter. The barriers neither distribute evenly across the layers nor operate independently. The strategy-implementation gap (C3), is by construction an interface phenomenon, existing only because a P-layer commitment fails to find a G-layer carrier. Regulatory fragmentation (C5, C6) is a G-layer condition whose consequences are recorded almost entirely as I-layer effects in assessment practice and integrity management. The divide barrier (C11), originates in P-layer resourcing decisions but is experienced as an I-layer constraint on who can participate. This interlocking pattern is the empirical substance of the proposition: where strong P, layer ambition meets weak G, layer carriers and weak I, layer capability, the outcome is bounded by the weaker layers rather than lifted by the stronger. Consistency is not confirmation, and Section 5.6 specifies what would count as a test.

The four enablers converge on a single observation: AI integration in ASEAN HE is reported to succeed where it is embedded in deliberative governance structures and resourced pedagogical innovation, and to disappoint where treated as a procurement decision or a policy declaration. Hughes et al. (2025), reach a congruent conclusion, identifying the pace of AI development, reliance on generative AI for academic outputs, disparities in AI literacy, training-data risks, output reliability and weak regulation as interdependent factors with high driving power. Bohman et al. (2014) arrive at it from the opposite direction: initiatives that worked were anchored in locally salient problems, supported by institutional leadership and combined online with offline activity, while those that failed did so through institutional resistance and contextual misalignment, rather than technical inadequacy. Read through PGI, these findings share a structure: factors that interact strongly across layers cannot be remedied at a single layer.

4.5. RQ3: Theoretical frameworks and the conceptual gap

Three families of framework appear in the charted data set, each addressing one layer or one pair without integrating across the three. The first, comprises technology-acceptance models, namely TAM (Davis, 1989), UTAUT (Venkatesh et al., 2003) and UTAUT2 (Venkatesh et al., 2012), predominantly applied in survey and case-study research on intention to use generative AI tools (Chakamanont et al., 2025); these map onto the I, layer. The second, comprises of governance-oriented

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

frameworks, including policy-network theory (Howlett, 2002) and networked-governance perspectives used to analyse interaction between states, universities, industry and civil society in national AI strategy formation, with Song and Ding (2025), drawing on adjacent international-relations frameworks; these map onto P and G. The third comprises socio-technical and pedagogical frameworks combining acceptance constructs with ethical, affective and pedagogical dimensions (Bahroun et al., 2023; Buragohain & Chaudhary, 2025; Hughes et al., 2025); these traverse G, and I, but engage P, only weakly. Critical-discursive work on how AI is constructed in HE (Bearman et al., 2023) and multidisciplinary agenda-setting on generative AI (Dwivedi et al., 2023), share this third profile.

The conceptual gap is, therefore, not an absence of theory but an absence of integration between theories, which is what PGI is designed to supply, and the consequences of leaving it open are documented nearby. Reviewing how resilience was conceptualised in higher education during the pandemic, Celbis et al. (2025), find that divergent definitions and operationalisations, applied at different levels of analysis, made comparison between studies effectively impossible, and that this fragmentation complicated not only the scholarly conversation but the derivation of recommendations for support policy. The mechanism transfers: where a field's constructs do not commensurate, its evidence cannot be aggregated into policy guidance, and the policy-evidence relationship weakens for conceptual reasons, and not volumetric ones. This is a second, independent route to the asymmetry documented in Section 4.2, implying that increasing research volume alone would not close it. Its four ASEAN-grounded commitments, set out in Section 2.2, distinguish it from imported frameworks that assume binding harmonisation, linguistic homogeneity, comparable policy maturity or ambition-driven diffusion. Whether the framework earns its place is an empirical question, and Section 5.6, states the conditions under which it would fail.

5. Discussion

5.1. Aspirational convergence with implementation divergence

Read through the mechanism in Section 2.3, the charted material exhibits a pattern that may be named aspirational convergence with implementation divergence. Member states share a converging normative vocabulary in which human-centric AI, AI literacy and responsible innovation recur, while the institutional carriers of those concepts, namely quality-assurance frameworks, professional-development programmes, faculty performance metrics and regulatory infrastructure, remain country-specific and unevenly developed. The framework explains why this may persist rather than resolve: convergence occurs at the P, layer and upper G, layer, where ideas travel cheaply across consensus-based governance, whereas divergence persists at the lower G, and I, layers, where capacity is costly, locally embedded and non-transferable. Because outcomes are bounded by the weakest of these, cheap convergence at the top cannot lift the system, and the binding constraint sits precisely where convergence is most expensive.

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

A second axis of divergence concerns the drivers of adoption: in some member states the dominant rationale is global competitiveness, in others AI is positioned as an instrument for closing equity gaps, so a single regional template will fit unevenly. The Responsible AI Roadmap (ASEAN Secretariat, 2025) acknowledges this through differentiated guidance, but the mechanism above implies that differentiation concentrated at the P, layer cannot resolve a constraint binding at the lower G, and I, layers; support must be designed across all three layers simultaneously rather than at the policy layer alone, where it currently concentrates.

5.2. Is the asymmetry transitional or emerging-structural?

The rival explanation for the asymmetry documented in Section 4.2, is that the indexed evidence base is simply young and will converge with policy as the field matures. That is a likely default reading of this data set . What can be done, and what is done here, is to state three considerations that make the purely transitional reading incomplete, and then to specify the evidence that would decide between the two.

The first is distributional: if the asymmetry were a maturation lag, indexed output would track policy ambition with a delay, so the states producing most policy would eventually produce most evaluation. The charted data setdoes not even track it weakly. That fits a capacity asymmetry better than a uniform lag, although with three indexed records the observation is suggestive rather than demonstrative. The second is disciplinary: the indexed work that exists skews towards computing and engineering, away from education and governance research, so the capacity to evaluate HE-specific governance claims may not merely be delayed but located in the wrong disciplines. The third is institutional: the policy data set is generated by transnational actors whose policy-production capacity, exceeds structurally, that of any national education-research community, so the asymmetry may be reproduced by the division of capacity itself rather than dissolved by time.

Two kinds of evidence would settle the question, and both are obtainable. Longitudinal replication of the search at intervals would show whether the indexed stream is converging on the policy stream, diverging, or holding a constant ratio; a constant or widening ratio over several years would be difficult to reconcile with a maturation lag. Comprehensive member-state mapping would show whether research output is distributed independently of policy output across all ten states. Until that evidence exists, the appropriate description is an emerging governance pattern for which a structural explanation is available and a transitional explanation is not excluded. The practical implication is, nonetheless, substantial. If there is a reasonable prospect that the conditions producing the asymmetry also reproduce it, waiting for organic accumulation is a weak strategy, and deliberate investment in the evidence base is a reasonable hedge whether or not the structural reading prevails.

5.3. Theoretical contribution to digital-governance scholarship

Against the traditions summarised in Section 2.1, PGI's distinctive move is to specify a mechanism, non-substitutable layer coupling, that converts their descriptive observations into a falsifiable prediction: in coupled digital-governance systems, integration outcomes are bounded by minimum-

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

layer capacity. Pairing a scoping review with an analytical framework has precedent in higher-education policy research. Shamsir et al. (2022), reviewed institutional responses to earlier disease outbreaks, populated a Haddon matrix for pandemic preparedness from the findings and illustrated it against the experience of Malaysian universities, on the express grounds that no general preparedness framework for such institutions existed. The parallel is close, including the motivating absence. The difference is that their matrix was populated from the reviewed studies, whereas PGI was specified a priori and used to structure extraction (Section 2.4). The claim the framework licenses is not that capacity matters, which no one disputes, but that the distribution of capacity across coupled layers, and specifically its minimum, is the operative predictor of integration outcomes.

This speaks directly to digital-governance scholarship beyond higher education. Two studies in this journal bear directly on that reading: Battista and Rivas-de-Roca (2025), on the accountability and legitimacy effects of embedding AI in public institutions, and Liu and Khalid (2025), on the joint operation of the digital divide, cybersecurity and institutional trust. Liu and Khalid's comparative evidence is germane: high connectivity coexists with substantial literacy gaps, trust operates as a mediating condition and not as an outcome, and jurisdictions succeed where infrastructure investment, regulatory protection and citizen-facing education are pursued together rather than sequentially. That is an interdependence claim of exactly the kind PGI formalises, and what PGI adds is the limiting-factor logic those studies imply but do not state. The scope conditions delimit portability accordingly: the logic should travel to other regional contexts characterised by consensus-based, non-binding harmonisation and heterogeneous capacity, and should not be expected to hold where authority is binding and capacity uniform.

5.4. Educational informatics, pedagogy and academic integrity

The informatics dimension illustrates the mechanism where it bites hardest. AI-augmented learning analytics, adaptive systems and automated feedback offer real opportunities, particularly in resource-constrained settings, yet uncritical adoption risks displacing academic judgement, narrowing the skills students develop and entrenching the cultural assumptions embedded in the underlying models (Buragohain & Chaudhary, 2025; Hughes et al., 2025; UNESCO, 2023). Academic integrity is the most acute case. The data set reports widespread uncertainty about assessing learning fairly when generative tools produce work difficult to distinguish from student output. Authentic assessment, oral defence and process-oriented evaluation are documented as responses, but implementation is uneven, and the supporting infrastructure of institutional policy, quality-assurance criteria and integrity training remains underdeveloped.

Through the framework this is a characteristic, weakest-layer-binds dynamic: G,layer principles cannot translate into I, layer practice without P, layer investment in the institutional carriers that mediate between them, so integrity outcomes are bounded by whichever is weakest rather than by the strength of the regional principles alone. The point is not that regional ethics guidance is unimportant but that its causal path to the seminar room runs entirely through instruments the charted data set shows to be sparsely developed.

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

5.5. What scenario-based agenda-setting can and cannot deliver

One influential response to evidence scarcity is to build the agenda prospectively rather than wait for data. Wimmer et al. (2020), applied scenario-based science and technology roadmapping to identify research and training needs for disruptive technologies in the public sector: seventy experts and students reviewed thirteen scenarios, generating sixty-two research, and fifty-four training needs consolidated into six and five. The attraction for the ASEAN case is obvious, since it yields a defensible agenda without an empirical base that does not yet exist, and Section 5.6 draws on it.

Its limits are equally instructive, and the authors are candid about several. Wimmer et al. (2020), report that the competence area of participating experts shaped the needs elicited, that groups lacking expertise in a scenario's field probably underestimated some needs, that policymakers and representatives of non-governmental and public institutions were largely absent, that participants were overwhelmingly European, and that an iterative validation step would have added rigour. Two further limitations follow from the logic of the method, not from its execution. First, scenario technique is future-oriented and expert-driven: it is well suited to identifying which capabilities a desirable future would require and poorly suited to explaining why present capabilities are distributed as they are. Applied without adjustment to ASEAN HE, it would risk understating the structural conditions that actually shape AI governance in the region: uneven digital infrastructure, funding disparities, the configuration of state-university relations in each member state, competitive pressures in marketised HE sectors, and dependence on external technology vendors whose terms and pricing are set elsewhere. Second, where evidence is thin, expert deliberation can reproduce expert assumptions rather than capture the situated realities of students, faculty, administrators and less-resourced institutions, which is precisely the population whose constraints the proposition identifies as decisive.

The corrective is not to discard roadmapping but to pair it with regionally grounded political-economy and socio-technical analysis. Bohman et al.'s (2014), evaluation of digital participation in university decision-making is instructive because it is an empirical study of digital governance inside higher education, not a projection about it. Its three modes of transformation failure, summarised in Section 2.1, map onto the present framework with little strain: a faulty intervention logic is a P, layer defect; misalignment with external factors is a failure at the P,G interface; and an unanticipated barrier is typically an I,layer or lower-G,layer condition that policy design did not foresee. They found that performance indicators were set arbitrarily, in a field lacking an agreed standard of what counts as a good result, and consequently proved of little use for management or evaluation. That is a direct warning for the AI-in-HE monitoring frameworks now being drafted across the region, as is their observation that lessons in this domain are repeatedly learned and seldom applied.

For ASEAN HE the implication is a two-track agenda: scenario-based roadmapping to specify capability targets, and political-economy-informed comparative case research to explain the uneven distribution of capacity that determines whether those targets are reachable, and for whom. The framework proposed here is intended to hold both tracks together, by naming the layers at which capability targets must be met and by making the distribution of capacity across them, rather than its average, the object of explanation.

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

5.6. A falsification and evidence-building agenda

The proposition is designed to be tested rather than asserted, and three designs would test it directly. The first is a comparative case study in which, theweakest layer varies while holding the others relatively constant and traces system-level outcomes; the proposition predicts that outcomes track the weakest layer irrespective of which it is. The second is quantitative: index P, G, and I, layer capacity separately and test whether minimum layer capacity predicts integration outcomes better than average layer capacity in a properly specified model, the proposition being disconfirmed if the mean predicts at least as well. The third, is a mixed methods study of the institutional carriers mediating between regional principles and classroom practice, which would identify the mechanism's observable intermediate steps.

Four evidence building priorities follow from the limitations of this review. A comprehensive member-state policy data set is the most urgent: national AI strategies, HE-sector regulations and quality-assurance guidance for all ten states, charted with the instrument in Table 3, would convert the apex-level characterisation offered here into a comparative account and allow the distributional claim in Section 5.2, to be tested directly. Both the comprehensive data set and the replications would benefit from a publicly deposited protocol registered before execution, as Tschotschel et al. (2025) demonstrate for a review of comparable scope; pre-registration matters more than usual here, because a claim about how much evidence exists is only as credible as the search that produced it. Second, longitudinal replication of the search at defined intervals would establish whether the asymmetry is closing. Third, stakeholder consultation would bring students, faculty, administrators and policymakers into the evidence base directly rather than through documents written about them, addressing the expert-assumption risk identified in Section 5.5. Fourth, a comparative study of quality-assurance responses would establish whether the carrier the framework identifies as decisive is being built anywhere in the region. Two candidates merit attention because they exist already and sit at the binding interface: the ASEAN University Network, whose remit covers quality assurance and academic collaboration across member states, and the AI Ready ASEAN initiative, which pursues AI literacy at regional scale through a train-the-trainer model. Neither appears in the charted data set, which is itself informative, and both should enter the comprehensive data set. Design-based research on culturally and linguistically grounded pedagogical models would address the localisation constraint coded C10 and C11.

5.7. Academic and practical contributions

The academic contribution is fourfold. The review provides an evidence map of AI adoption in ASEAN HE framed as a digital-governance problem, with a reproducible search and selection infrastructure later reviews can re-run and extend. It proposes an integrative framework with an explicit mechanism and stated scope conditions, converting an interdependence claim that recurs descriptively in digital-governance research (Liu & Khalid, 2025; Wimmer et al., 2020) into a falsifiable structural proposition. It supplies a charting instrument and coding framework, reported in full in Table 3, that others can apply to national or institutional corpora so that findings become comparable across studies. And, it specifies the conditions under which its own central claims would fail.

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

The practical contribution is addressed to four audiences. For regional bodies, each principle in the Responsible AI Roadmap should be paired with a named institutional carrier and a capacity baseline, and implementation reporting should be disaggregated by layer, since a regional average conceals the minimum the framework identifies as binding. For national ministries, education ministries and quality-assurance agencies should be co-architects of national AI strategy from the design stage rather than recipients at implementation, and the governance carriers require dedicated funding lines of their own. For quality-assurance agencies, the implication is direct: without AI-related criteria in programme accreditation, regional principles have no binding mechanism, so developing interoperable criteria is higher-leverage than further principle-setting. For institutional leaders, faculty capability should be treated as infrastructure and not as a series of training events, and initiatives are more likely to embed when anchored in locally salient problems, visibly supported by leadership, and delivered through combined online and offline activity, the three success conditions Bohman et al. (2014), derive empirically from the higher-education case.

One implication cuts across all four audiences. Regulatory harmonisation efforts will produce only superficial convergence for as long as the weakest implementation layer is left under-resourced, and monitoring frameworks that report regional averages will not detect this. Reporting minimum-layer capacity alongside the average is a low-cost change with high diagnostic value, and it is the single practical recommendation that follows most directly from the framework.

5.8. Limitations of the review

Beyond the methodological limitations in Section 3.8, two points bear on interpretation. ASEAN governance documents are produced unevenly and some national instruments may not have been publicly available during the search window, so the policy side of the asymmetry is itself incompletely observed. And because no stakeholder consultation was conducted, practitioners, policymakers and students are represented only as documents written by others, a particular weakness in a review, arguing for the salience of implementation-level capacity. The small data set remains, simultaneously, a constraint on the review and the finding it theorises; the proposition is offered so that this constraint becomes a testable claim rather than a standing apology.

6. Conclusion

This preliminary scoping review reaches three conclusions. First, the disjunction between the volume of AI-HE policy issued by ASEAN governments and regional bodies and the volume of indexed empirical scholarship available to evaluate it is substantial, and is best read on present evidence as an emerging governance pattern rather than an established structural regularity; Section 5.2, specifies the longitudinal and comparative evidence that would determine which reading holds. Second, the Policy-Governance-Informatics framework integrates three previously parallel literatures into a single ASEAN-grounded socio-technical governance lens, and its weakest-layer-binds proposition offers future work a falsifiable claim with stated scope conditions rather than a further descriptive assertion. Third, the six barriers and four enablers documented across the data set neither distribute

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

evenly across the layers nor operate independently, and their interlocking pattern is consistent with, though it does not confirm, the proposition advanced.

Five priorities for future research follow, and are specified in comparative case studies in which the weakest layer varies; a charted member-state policy data set covering all ten states; comparative study of quality-assurance responses to AI; longitudinal mixed-methods research on the equity implications of adoption for low-income, rural and minority-language learners; and stakeholder-consultation studies that bring students, faculty and policymakers into the evidence base directly.

For policymakers and institutional leaders the implication is specific: regulatory harmonisation will produce superficial convergence for as long as the weakest implementation layer remains under-resourced, and the higher-leverage intervention is sustained, capacity-sensitive investment in the carriers that translate regional principles into faculty practice, namely quality-assurance frameworks for AI-related programmes, professional-development infrastructure, and contextualised informatics tools for the region's under-served languages. The wider claim advanced here, is modest in evidentiary terms and consequential in analytical ones. AI adoption in ASEAN higher education should no longer be analysed as three parallel problems, of policy, governance and informatics, but as one interdependent system in which, if the proposition survives testing, the layer with the weakest implementation capacity determines the ceiling of regional integration outcomes.

References

Alkathiri, E. S., & Alharbi, M. F. (2024). A scoping review of Arab public relations scholarship. Public Relations Review, 50(2), Article 102435. https://doi.org/10.1016/j.pubrev.2024.102435

Arksey, H., & O'Malley, L. (2005). Scoping studies: Towards a methodological framework. International Journal of Social Research Methodology, 8(1), 19-32. https://doi.org/10.1080/1364557032000119616

ASEAN Secretariat. (2024a). ASEAN guide on AI governance and ethics. Jakarta: ASEAN Secretariat.

ASEAN Secretariat. (2024b). Expanded ASEAN guide on AI governance and ethics: Generative AI. Jakarta: ASEAN Secretariat.

ASEAN Secretariat. (2025). ASEAN responsible AI roadmap 2025-2030. Jakarta: ASEAN Secretariat.

Bahroun, Z., Anane, C., Ahmed, V., & Zacca, A. (2023). Transforming education: A comprehensive review of generative artificial intelligence in educational settings through bibliometric and content analysis. Sustainability, 15(17), Article 12983. https://doi.org/10.3390/su151712983

Battista, D., & Rivas-de-Roca, R. (2025). Experimenting with algorithmic governance: Artificial intelligence between innovation and democratic responsibility. JeDEM - eJournal of eDemocracy and Open Government, 17(4), 103-115. https://doi.org/10.29379/jedem.v17i4.1177

Bearman, M., Ryan, J., & Ajjawi, R. (2023). Discourses of artificial intelligence in higher education: A critical literature review. Higher Education, 86(2), 369-385. https://doi.org/10.1007/s10734-022-00937-2

Bohman, S., Hansson, H., & Mobini, P. (2014). Online participation in higher education decision-making: A mixed-methods study of the MyUniversity EU project. JeDEM - eJournal of eDemocracy and Open Government, 6(3), 267-285. https://doi.org/10.29379/jedem.v6i3.247

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

Bour, C., Schmitz, S., Ahne, A., Perchoux, C., Dessenne, C., & Fagherazzi, G. (2021). Scoping review protocol on the use of social media for health research purposes. BMJ Open, 11, Article e040671. https://doi.org/10.1136/bmjopen-2020-040671

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology, 3(2), 77-101. https://doi.org/10.1191/1478088706qp063oa

Buragohain, D., & Chaudhary, S. (2025). Navigating ChatGPT in ASEAN higher education: Ethical and pedagogical perspectives. Computer Applications in Engineering Education, 33(4), Article e70062. https://doi.org/10.1002/cae.70062

Celbis, O., van de Laar, M., & Volante, L. (2025). Resilience in higher education during the COVID-19 pandemic: A scoping literature review with implications for evidence-informed policymaking. International Journal of Educational Research Open, 8, Article 100392. https://doi.org/10.1016/j.ijedro.2024.100392

Chakamanont, S., Punyabukkana, P., Sittipunt, P., Wongvises, K., Samoh, A., & Khabuan, S. (2025). Advancing ChatGPT in higher education: Beyond automation in teaching practices. AsTEN Journal of Teacher Education. Advance online publication. https://doi.org/10.56278/asten.vi.3346

Chheang, V., Heng, S., Thourn, K., & Yahoui, H. (2023). A survey of industry in Cambodia and future prospects: Industry 4.0. In Proceedings of the 8th International Conference on Digital Arts, Media and Technology (ECTI DAMT and NCON 2023). IEEE.

Cohen, J. (1960). A coefficient of agreement for nominal scales. Educational and Psychological Measurement, 20(1), 37-46. https://doi.org/10.1177/001316446002000104

Daudt, H. M. L., van Mossel, C., & Scott, S. J. (2013). Enhancing the scoping study methodology: A large, inter-professional team's experience with Arksey and O'Malley's framework. BMC Medical Research Methodology, 13, Article 48. https://doi.org/10.1186/1471-2288-13-48

Davis, F. D. (1989). Perceived usefulness, perceived ease of use, and user acceptance of information technology. MIS Quarterly, 13(3), 319-340. https://doi.org/10.2307/249008

Dwivedi, Y. K., Kshetri, N., Hughes, L., Slade, E. L., Jeyaraj, A., Kar, A. K., ... Wright, R. (2023). "So what if ChatGPT wrote it?" Multidisciplinary perspectives on opportunities, challenges and implications of generative conversational AI for research, practice and policy. International Journal of Information Management, 71, Article 102642. https://doi.org/10.1016/j.ijinfomgt.2023.102642

Howlett, M. (2002). Do networks matter? Linking policy network structure to policy outcomes: Evidence from four Canadian policy sectors 1990-2000. Canadian Journal of Political Science, 35(2), 235-267. https://doi.org/10.1017/S0008423902778232

Hughes, L., Malik, T., Dettmer, S., Al-Busaidi, A. S., & Dwivedi, Y. K. (2025). Reimagining higher education: Navigating the challenges of generative AI adoption. Information Systems Frontiers. Advance online publication. https://doi.org/10.1007/s10796-025-10582-6

Levac, D., Colquhoun, H., & O'Brien, K. K. (2010). Scoping studies: Advancing the methodology. Implementation Science, 5, Article 69. https://doi.org/10.1186/1748-5908-5-69

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

Liu, J., & Khalid, N. A. (2025). Exploring the interconnected dynamics of the digital divide, cybersecurity, and trust in enhancing e-democracy effectiveness. JeDEM - eJournal of eDemocracy and Open Government, 17(2), 90-109. https://doi.org/10.29379/jedem.v17i2.997

Mak, S., & Thomas, A. (2022). Steps for conducting a scoping review. Journal of Graduate Medical Education, 14(5), 565-567. https://doi.org/10.4300/JGME-D-22-00621.1

Munn, Z., Peters, M. D. J., Stern, C., Tufanaru, C., McArthur, A., & Aromataris, E. (2018). Systematic review or scoping review? Guidance for authors when choosing between a systematic or scoping review approach. BMC Medical Research Methodology, 18, Article 143. https://doi.org/10.1186/s12874-018-0611-x

Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., ... Moher, D. (2021). The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. BMJ, 372, Article n71. https://doi.org/10.1136/bmj.n71

Peters, M. D. J., Marnie, C., Tricco, A. C., Pollock, D., Munn, Z., Alexander, L., McInerney, P., Godfrey, C. M., & Khalil, H. (2020). Updated methodological guidance for the conduct of scoping reviews. JBI Evidence Synthesis, 18(10), 2119-2126. https://doi.org/10.11124/JBIES-20-00167

Saladie, N., Llorente, C., & Revuelta, G. (2025). A scoping review on the connection between research and practice in science communication. Journal of Science Communication, 24(05), Article V01. https://doi.org/10.22323/145520250811182624

Shamsir, M. S., Krauss, S. E., Ismail, I. A., Ab Jalil, H., Johar, M. A., & Abdul Rahman, I. (2022). Development of a Haddon matrix framework for higher education pandemic preparedness: Scoping review and experiences of Malaysian universities during the COVID-19 pandemic. Higher Education Policy, 35, 439-478. https://doi.org/10.1057/s41307-020-00221-x

Song, H., & Ding, Y. (2025). Comparing perspectives of students and experts regarding using ChatGPT in learning international politics: A case study of China-ASEAN AI cooperation. In 2025 International Conference on Artificial Intelligence and Education (ICAIE 2025). IEEE.

Tricco, A. C., Lillie, E., Zarin, W., O'Brien, K. K., Colquhoun, H., Levac, D., ... Straus, S. E. (2018). PRISMA extension for scoping reviews (PRISMA-ScR): Checklist and explanation. Annals of Internal Medicine, 169(7), 467-473. https://doi.org/10.7326/M18-0850

Tschotschel, R. S., Diamond, E., Howley, S. E., McNally, B., Morris, H. E., Perry, K. E., & Wilhelmsen, M. E. (2025). Public communication of climate and justice: A scoping review. WIREs Climate Change, 16(1), Article e932. https://doi.org/10.1002/wcc.932

UNESCO. (2023). Guidance for generative AI in education and research. United Nations Educational, Scientific and Cultural Organization. https://unesdoc.unesco.org/ark:/48223/pf0000386693

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. MIS Quarterly, 27(3), 425-478. https://doi.org/10.2307/30036540

Venkatesh, V., Thong, J. Y. L., & Xu, X. (2012). Consumer acceptance and use of information technology: Extending the unified theory of acceptance and use of technology. MIS Quarterly, 36(1), 157-178. https://doi.org/10.2307/41410412

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

Wimmer, M. A., Viale Pereira, G., Ronzhyn, A., & Spitzer, V. (2020). Transforming government by leveraging disruptive technologies: Identification of research and training needs. JeDEM - eJournal of eDemocracy and Open Government, 12(1), 87-113. https://doi.org/10.29379/jedem.v12i1.594

World Bank. (2024). Digital progress and trends report 2023. World Bank. https://doi.org/10.1596/978-1-4648-2049-6

Author Contributions

Dhita Widya Putri: Conceptualization, Methodology, Formal analysis, Investigation, Data curation, Writing – original draft, Writing – review & editing, Visualization, Project administration, Submission coordination.

Budi Riyanto: Conceptualization, Methodology, Formal analysis, Data curation, Writing – review & editing, Validation.

Dendy Muris: Investigation, Data curation, Formal analysis, Writing – review & editing, Validation. Submission coordination.

Sun Xinyuan: screening and charting, Writing – review & editing, Validation.

Chen Hantang: screening and charting, Writing – review & editing, Validation.

Yin Yucui: screening and charting, Writing – review & editing, Validation.

Adrián Szilárd Nagy: Supervision, Methodology, Conceptualization, Validation, Writing – review & editing.

All authors have read and agreed to the published version of the manuscript.

About the Author/s

Dhita Widya Putri

Dhita Widya Putri is a PhD candidate at the University of Debrecen, Hungary, Institute of Applied Economics, Doctoral School of Management and Business, Faculty of Economics and Business. She works in Indonesian Ministry of Higher Education, Science, and Technology. She holds bachelor's and master's degrees in communication studies from LSPR Institute of Communication and Business, Indonesia. Her research focuses on institutional resilience in higher education, with particular interests in strategic leadership, public service, digital capability, and organisational transformation.

Budi Riyanto

Budi Riyanto, Ph.D., is an Assistant Professor of International Relations in the Department of Communication at LSPR Institute of Communication and Business. He holds a Ph.D. in International Relations from the School of International Relations, University of International Business and Economics (UIBE), Beijing, China. His research focuses on diplomacy, strategic narratives, middle powers, and the role of digitalization in international relations.

Dendy Muris

Dr. Dendy Muris is the Head of the Communication Studies E-Learning Programme at LSPR Institute of Communication and Business, Indonesia. He holds a doctoral degree from Universitas Sahid and a master's degree in Marketing Communication from LSPR Institute. His research interests include broadcasting, digital media communication, social media, digital literacy, and emerging technologies, including the social and communicative implications of artificial intelligence.

Sun Xinyuan

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026

Sun Xinyuan is a PhD student at University of Debrecen, Hungary, Institute of Applied Economics, Doctoral School of Management and Business, Faculty of Economics and Business. Her academic interests are broadly related to business and management research, with a focus on developing knowledge in applied economic and organisational contexts.

Chen Hantang

Chen Hantang is a PhD student at University of Debrecen, Hungary, Institute of Applied Economics, Doctoral School of Management and Business, Faculty of Economics and Business. His research interests include rural revitalisation, regional development, policy analysis, and the relationship between regional structural conditions and public policy design.

Yin Yucui

Yucui Yin is a PhD student at the University of Debrecen, Hungary, Institute of Applied Economics, Doctoral School of Management and Business, Faculty of Economics and Business. Her research interests include finance, international business, and international business management, with a focus on applying management and financial perspectives to contemporary business issues.

Adrián Szilárd Nagy

Prof. Dr. Adrián Szilárd Nagy is a Professor at the Faculty of Economics and Business, University of Debrecen, Hungary, where he serves as Head of the Institute of Applied Economics. He holds a PhD in Management and Business from the University of Debrecen. His research interests include family business, entrepreneurship, higher education, labour market issues, and quality assurance, with extensive experience in applied management research.

 CC BY-NC 4.0 DEED Attribution-NonCommercial 4.0 International, 2026