International Journal of Economics, Commerce and Management
United Kingdom ISSN 2348 0386 Vol. 14, Issue 6, June 2026

https://ijecm.co.uk/

TOWARD A TWO-DIMENSIONAL FRAMEWORK FOR AI GOVERNANCE: A LITERATURE REVIEW OF GOVERNANCE LEVELS AND GOVERNANCE MECHANISMS

Ezmolda Barolli
Department of Statistics and Applied Informatics,
Faculty of Economy, University of Tirana, Tirana, Albania
ezmolda.barolli@unitir.edu.al

Ilir Kurti
Keminet sh.p.k, Tirana, Albania
ilir.kurti@keminet.net

Abstract

The rapid diffusion of AI has shifted attention from high-level ethical principles to actionable governance artifacts. However, existing research remains fragmented in organizing multilevel governance mechanisms and linking principles to practice. Multi level approaches that distinguish strategic, operational, and tactical controls are increasingly emphasized but not systematically mapped. This review develops and applies a two-dimensional framework integrating governance levels and mechanisms to map AI governance mechanisms, identify underexplored intersections, and derive preliminary insights into their effectiveness. A systematic literature review was conducted retrieving articles from major scholarly databases, including Scopus, Web of Science, IEEE Xplore, ACM, Semantic Scholar, using Consensus as an AI-assisted academic. We conducted two targeted queries on AI governance frameworks across governance levels and mechanisms, selecting the 50 most relevant papers from each query. Applying our framework shows dense coverage of strategic and operational levels through policies, oversight structures, and risk based frameworks, alongside a growing ecosystem of documentation and auditing tools, while tactical level "full" governance solutions remain sparse. The mapping highlights four underexplored intersections: enforcement and

accountability at the team and system levels; process-oriented implementation at the organizational level; adaptive and experimental governance at the sectoral and national levels; and coordination and interoperability across international and multilevel governance contexts. Organizing AI governance by governance levels and mechanism types provides a coherent lens for systematizing a fragmented field, identifying research gaps, and guiding future governance artifacts, although the predominance of conceptual studies and limited empirical validation leave the practical effectiveness of two-dimensional governance models an open research question.
Keywords: AI Governance, Governance Levels, Governance Mechanisms, Organizational AI Governance, Two-Dimensional Governance Framework, Multi-Level Governance

INTRODUCTION

The rapid proliferation of artificial intelligence (AI) across sectors has intensified the need for robust governance frameworks that operate effectively at strategic, operational, and tactical levels. Recent literature highlights a shift from high-level ethical principles to actionable governance artifacts, such as pattern catalogues, risk management models, documentation standards, and auditing mechanisms, that enable organizations to translate responsible AI ideals into practice (Papagiannidis et al., 2025; Lu et al., 2022; Wirtz et al., 2022; Mökander, 2023; Li et al., 2021). While AI governance research has evolved from abstract principles to more actionable frameworks, the literature remains fragmented in how it organizes and operationalizes governance mechanisms. Multi-level governance approaches are increasingly emphasized, with frameworks distinguishing between industry-wide (strategic), organizational (operational), and team/project (tactical) controls (Lu et al., 2022; Pinho et al., 2025; Lestari et al., 2025). Earlier IT-governance research likewise showed that governance effectiveness depends on how responsibilities and critical success factors are distributed across organizational levels and proposed holistic analytical constructs to capture those differences in practice. Barolli and Kurti (2018) extend this perspective by showing that strategic, tactical, and operational levels share some governance priorities but also differ in ways that affect business–IT alignment, while Kurti et al. (2014) identify a holistic set of critical success factors for effective IT governance in the Albanian public sector, with particular emphasis on resource management and the human dimension. These earlier governance studies reinforce the value of organizing AI governance not only by abstract principles, but also by level-specific responsibilities and implementation mechanisms. Despite progress, persistent gaps remain in operationalizing principles-to-practice, ensuring inclusivity across geographies and stakeholder groups, and adapting governance to rapidly evolving technologies such as generative AI (Veale et al., 2023; Sadiq et al., 2025; Gandhi et al., 2025).

A promising approach is to map the field along two dimensions: (1) governance level: strategic, operational, and tactical; (2) mechanism type: structures, processes, and tools. This dual-axis organization clarifies who is responsible for what at each level and how governance is enacted in practice (Karataş & Çakır, 2023; Batool et al., 2025; Papagiannidis et al., 2025; Papagiannidis et al., 2022; Bhaskaran & Jaafar, 2022; Haes & Grembergen, 2004). Several recent reviews and frameworks have begun to adopt or recommend this multidimensional view, arguing that it enhances clarity, supports implementation, and reveals research gaps (Karataş & Çakır, 2023; Batool et al., 2025; Papagiannidis et al., 2025).

Batool et al. (2025) classify AI governance artifacts by multiple levels (team, organization, industry, national, international) and artifact types (frameworks, tools, models, guidelines), providing a broad inventory but not a fully populated level × mechanism matrix . Papagiannidis et al. (2025) use a structural–relational–procedural lens mapped onto organizational layers and identify best practices, barriers, and outcomes, yet they do not systematically fill a 3×3 level–mechanism space. Wirtz et al. (2022) proposes a risk and guideline based integrative framework focused on risk categories and mitigation guidelines rather than on the full spectrum of structures, processes, and tools across strategic, operational, and tactical levels. In contrast, this review uses a two-dimensional 3×3 construct (strategic/operational/tactical × structures/processes/tools) as its organizing backbone, systematically populates and assesses all level × mechanism intersections, and identifies underexplored cells and cross-cutting integration patterns. Moreover, unlike prior work, we compare diverse frameworks and artifacts (hourglass, ARGO, pattern catalogues, maturity models) against our construct and extract cross-cutting “integration patterns” (top-down translation, bottom-up feedback, shared foundations/local implementation).

Our goal is to pro-level vide a comprehensive, two-dimensional synthesis of AI governance mechanisms across levels. Using our construct, we do a systematic gap analysis of underexplored level × mechanism cells. Our results can serve as actionable guidance for scholars and practitioners on mapping existing and future artifacts into this matrix for design and implementation support.

Building on this two-dimensional view of AI governance, levels (strategic, operational, tactical) × mechanisms (structures, processes, tools), this review pursues three main research questions:

RQ1: How has the existing AI governance literature articulated and operationalized mechanisms across the three governance levels (strategic, operational, tactical) and the three mechanism types (structures, processes, tools)?

RQ2: Which intersections in this two-dimensional space of level × mechanism remain underexplored or weakly supported by existing frameworks and artifacts, and what research opportunities do these gaps suggest?

RQ3: What preliminary insights does the literature provide about the effectiveness and practical impact of two-dimensional AI governance models when implemented in real organizations?

METHODOLOGY

This study employed a systematic literature review by searching major scholarly databases and digital libraries, including Scopus, Web of Science, PubMed, IEEE Xplore, ACM Digital Library, Semantic Scholar, Crossref, OpenAlex, and arXiv, while using Consensus as an AI-assisted academic search platform to enhance the comprehensiveness of the literature search, to identify and synthesize work on multi-level AI governance mechanisms to broaden retrieval and support natural language discovery of relevant studies (Fabiano et al., 2024; Bolanos et al., 2024). This choice was motivated by prior research showing that AI-assisted literature search tools can rapidly surface relevant manuscripts, support comprehensive search strategy development, and improve efficiency in handling very large evidence bases, especially where terminology is fragmented or interdisciplinary (Fabiano et al., 2024; Sušnjak et al., 2024; De La Torre-López et al., 2023). It has a scoping orientation (broad mapping + gap identification) rather than quantitative meta-analysis.

Consensus was used during query refinement and relevance discovery, while eligibility assessment, full-text screening, and final inclusion decisions remained under authors control to preserve transparency and methodological rigor (Fabiano et al., 2024; Malik & Terzidis, 2025). This hybrid design is consistent with prior methodological work arguing that AI tools are most appropriate when used to enhance comprehensiveness, speed, and gap detection, while researchers retain responsibility for validation, interpretation, and reproducibility (Fabiano et al., 2024; Malik & Terzidis, 2025; Sami et al., 2024). The decision not to rely exclusively on AI ranking also reflects known limitations of AI-assisted review tools, including variable recall, bias toward highly cited papers, false positives, and the continuing need for human quality control (Bernard et al., 2025; Tosi, 2025; Mogoale et al., 2025). Accordingly, relevance rankings from Consensus were treated as decision support rather than automatic inclusion criteria, and all shortlisted records were manually checked against the review's inclusion criteria before synthesis (Bernard et al., 2025; Malik & Terzidis, 2025).

The process of selecting papers of interest was based on:

Database: Searching major scholarly databases and digital libraries, including Scopus, Web of Science, PubMed, IEEE Xplore, ACM Digital Library, Semantic Scholar, Crossref, OpenAlex, and arXiv.

Search strategy: For our research we used two targeted query families with counts at each stage. The first query was on AI governance frameworks and artifacts at strategic, operational, and tactical levels. The second query focused on AI governance structures, processes, and tools at strategic, operational, and tactical levels.

Screening: Screening the queries results the following were performed: de-duplication, title/abstract screening for relevance to multi-level governance, then full-text/abstract eligibility checks.

The first query identified 1006 potentially relevant papers; after de-duplication and screening for relevance to multi-level governance structures or artifacts (e.g., pattern catalogues, risk models), 456 were screened further. Of these, 255 met eligibility criteria based on abstract/full-text review.

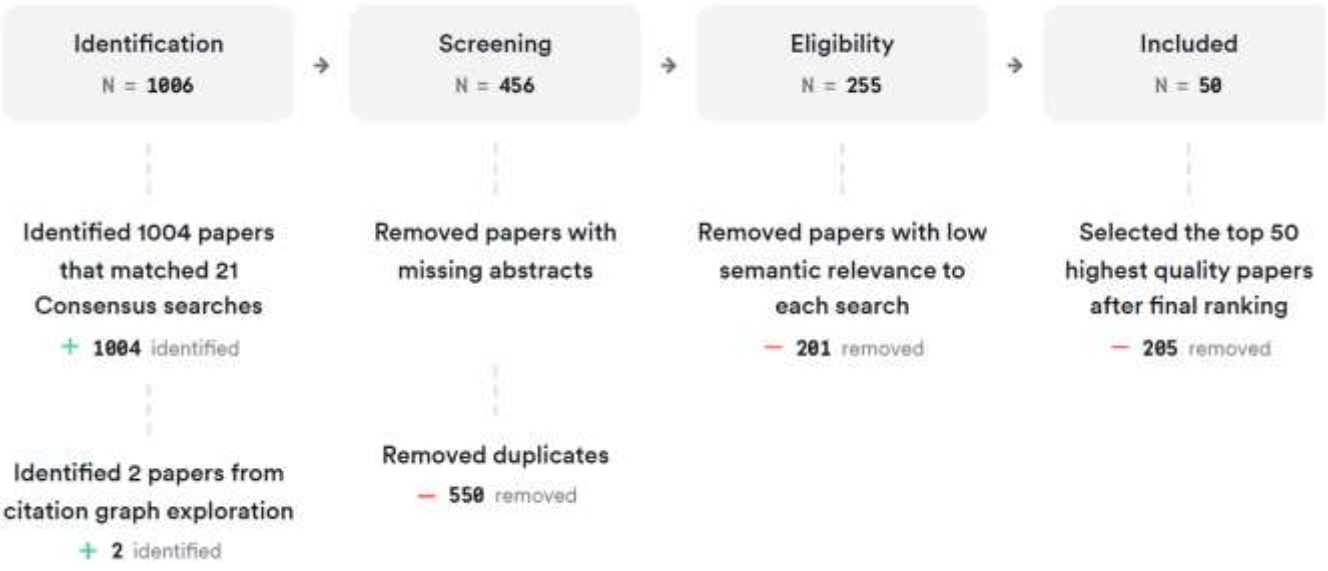

Figure 1. Flow diagram of paper identification through inclusion stages – AI governance frameworks and artifacts query.

Source: Authors' own analysis based on the Consensus flow diagram

The second query identified 1088 potentially relevant papers; after de-duplication and screening for relevance to both dimensions (levels × mechanisms), 571 were screened further. Of these, 462 met eligibility criteria based on abstract/full-text review.

Figure 2. Flow diagram of paper identification through inclusion stages – AI governance mechanisms at organizational levels

Source: Authors' own analysis based on the Consensus flow diagram

Selection Rule: Final synthesis restricted to “top 50 most relevant” per query; relevance was based on Consensus ranking plus manual judgment. This was a methodological choice.

The included literature consists of a mix of systematic reviews, conceptual frameworks, and empirical or case-based studies covering strategic, operational, and tactical AI governance mechanisms. Empirical contributions (e.g., case studies of national initiatives, sectoral governance models, and organizational frameworks) typically provide rich descriptive insight into structures, processes, and tools but rarely apply standardized evaluation designs or comparative metrics, limiting causal claims about effectiveness or generalizability. In contrast, systematic reviews and conceptual papers offer well-structured models and typologies (such as multi-level matrices, layered frameworks, and pattern catalogues) but are often based on narrative synthesis and do not consistently report formal quality assessment of underlying evidence. Taken together, this means that the conceptual robustness of AI governance frameworks currently exceeds the empirical validation of how these mechanisms perform in diverse real world settings, and findings should be interpreted as indicative rather than definitive.

Governance mechanisms and artifacts across levels

Across the literature, governance mechanisms recur at three main levels: strategic (national/industry/board), operational (organizational), and tactical (team/project).

Batool et al.'s systematic review explicitly classifies AI governance artifacts by level (team, organization, industry, national, international) and by how AI is governed (frameworks, tools, policies, models, guidelines) (Batool et al., 2025). They group artifacts above organizations into three governance levels: industry, national, and international (Batool et al., 2025). These artifacts function as macro level reference frameworks, standardization baselines, and regulatory anchors that cascade down into organizational artifacts.

This leveled view (team /organization /industry /national/ international ≈ tactical /operational /strategic) clarifies:

- Who produces and uses which artifacts (e.g., model cards vs. national strategies) (Batool et al., 2025; Kawakami et al., 2024; Lu et al., 2022)
- Where gaps lie (notably the scarcity of explicit team-level governance solutions) (Batool et al., 2025; Winecoff & Bogen, 2024)
- How artifacts interact vertically, from international principles to organizational processes to team level documentation (Batool et al., 2025; Wirtz et al., 2022; Lu et al., 2022; Radu, 2021).

Overall, artifacts become easier to select and design when mapped to their primary governance level and intended users. In the following sections we descriptively map the main governance mechanisms and artifacts at each level (strategic, operational, tactical) and then distill analytical insights about cross level patterns and gaps. Results, presented in tabular format, are maps of what already exists and not our interpretation.

Strategic level – Descriptive mapping

Strategic level mechanisms focus on aligning AI with organizational or societal goals through high-level oversight bodies, formalized policies, and broad risk management instruments (Table 1).

Artifacts are direction setting and norm forming:

- National AI strategies, state AI policies, ethical principles, and standards (e.g., national strategies, public-sector AI frameworks) (Batool et al., 2025; Taeihagh, 2021; Wirtz et al., 2022; De Almeida & Júnior, 2025; Papyshev & Yarime, 2023)
- International and sectoral guidelines/codes (OECD/UNESCO principles, industry codes, global frameworks) (Batool et al., 2025; Gasser & Almeida, 2017; Schmitt, 2021)

Artifacts at strategic level define long term objectives, acceptable risk thresholds, and shared norms; shape regulatory baselines that organizational artifacts must implement (Batool et al., 2025; Gasser & Almeida, 2017; Taeihagh, 2021; Wirtz et al., 2022; Schmitt, 2021; Papyshev & Yarime, 2023).

Table 1. AI Governance Mechanisms and Artifacts at the Strategic Level

Strategic level (national, industry, board / C-suite)		
	Governance Mechanisms	**Artifacts**
Structures	National AI strategies, ethics councils, and regulatory agencies or oversight bodies (De Almeida & Júnior, 2025; Radu, 2021; Attard-Frost et al., 2024; Schmitt, 2021)- Corporate boards and executive AI committees embedding AI into corporate/IT governance structures (Mäntymäki et al., 2022; Hilb, 2020)	**Industry level** • Industry codes of conduct, sectoral standards, pattern catalogues (e.g., Responsible AI Pattern Catalogue's industry-level governance patterns) (Lu et al., 2022) • Certification schemes and sector-specific best-practice catalogues (Wirtz et al., 2022; Lu et al., 2022; Agarwal & Nene, 2025) **National level** • National AI strategies, AI policies, ethics principles documents, and public-sector AI governance frameworks (e.g., AIGov4Gov) (Batool et al., 2025; Wirtz et al., 2022; De Almeida & Júnior, 2025; Robles & Mallinson, 2023) **International level** • Supranational guidelines and taxonomies (OECD, UNESCO, EU), high-level principle sets and regulatory frameworks (Batool et al., 2025; Wirtz et al., 2022; Radu, 2021; Schmitt, 2021).
Processes	Strategy-setting, risk appetite definition, and high-level AI policy/ethics principal formulation (Birkstedt et al., 2023; De Almeida & Júnior, 2025; Radu, 2021; Mäntymäki et al., 2022)- Multi-stakeholder consultation, public participation, and hybrid state–industry governance arrangements (De Almeida & Júnior, 2025; Radu, 2021; Schmitt, 2021)	
Tools	National strategies and policy roadmaps, guideline taxonomies, risk–guideline integrative frameworks (Wirtz et al., 2022; Attard-Frost et al., 2024; Attard-Frost & Lyons, 2024; Schmitt, 2021)- Macro "AI governance system" mapping frameworks for actors, logics, norms, and rules (Attard-Frost & Lyons, 2024)	

Source: Authors' own analysis

Operational level – Descriptive mapping

Operational level mechanisms translate strategy into practice via dedicated units or roles that oversee implementation of policies through standardized procedures and supporting documentation (Table 2).

Artifacts are coordination and control instruments that connect principles to practice across projects.

- AI governance frameworks and models (organizational RAI frameworks, AIGov4Gov, risk–guideline integrative frameworks) (Batool et al., 2025; Wirtz et al., 2022; De Almeida & Júnior, 2025)
- Internal policies, guidelines, codes of conduct defining roles, processes, and escalation paths (Batool et al., 2025; Birkstedt et al., 2023; Mäntymäki et al., 2022)

- Registries and inventories: model/AI system registries, co-versioning registries for data model code dependencies (Lu et al., 2022).

Artifacts at this level are used to: allocate responsibilities, standardize lifecycle processes, manage risk portfolios, and ensure compliance across multiple teams (Batool et al., 2025; Birkstedt et al., 2023; Wirtz et al., 2022; De Almeida & Júnior, 2025; Lu et al., 2022).

Table 2. AI Governance Mechanisms and Artifacts at the Operational Level

Operational / organizational level		
	Governance Mechanisms	**Artifacts**
Structures	AI oversight units or Responsible AI offices; cross-functional AI governance committees (Birkstedt et al., 2023; Batool et al., 2025; Papagiannidis et al., 2022; De Almeida & Júnior, 2025)- Integration of AI governance within corporate, IT, and data governance structures (COBIT-like) (Birkstedt et al., 2023; Schneider et al., 2020; Mäntymäki et al., 2022)	**Frameworks & models** • Ethical AI governance frameworks, organization-wide AI governance models (Batool et al., 2025; Birkstedt et al., 2023; Wirtz et al., 2022) • Sectoral maturity models such as HAIRA for healthcare AI governance (Hussein et al., 2024) **Policies & guidelines** • AI governance through internal policies, guidelines, ethical principles codified into organizational rules (Batool et al., 2025; Birkstedt et al., 2023; De Almeida & Júnior, 2025) **Documentation ecosystems** • Organization wide AI documentation standards (templates, registries, model inventories, co-versioning registries) (Winecoff & Bogen, 2024; Lu et al., 2022)
Processes	Organization-wide AI governance processes covering lifecycle, ethics translation, and compliance monitoring (Birkstedt et al., 2023; Batool et al., 2025; Wirtz et al., 2022; Schneider et al., 2020)- Training, awareness, stakeholder management, and culture-building activities (Birkstedt et al., 2023; De Almeida & Júnior, 2025)	
Tools	Organizational AI governance frameworks and maturity/readiness models (e.g., HAIRA in healthcare) (Birkstedt et al., 2023; Hussein et al., 2024)- Risk-based governance frameworks mapping risk categories to mitigation guidelines (Wirtz et al., 2022)- Internal policies, standards, and auditing/checklist instruments (Birkstedt et al., 2023; Batool et al., 2025; Wirtz et al., 2022)	

Source: Authors' own analysis

At operational level, these artifacts operationalize principles, assign responsibilities, and standardize lifecycle practices.

Tactical level – Descriptive mapping

Tactical level mechanisms are embedded in day-to-day project work, focusing on concrete controls within teams responsible for developing or deploying AI systems (Table 3).

Artifacts here are implementation and transparency focused and tightly coupled to the AI lifecycle. Common artifacts at this level:

- Model and data documentation: Model Cards, Datasheets/Data Cards, Transparency Notes, Responsible AI impact assessments (Kawakami et al., 2024)
- Technical evaluation tools: fairness, robustness and explainability libraries (e.g., Fairlearn, InterpretML, AIF360) (Kawakami et al., 2024; Kuehnert et al., 2025)

The functions of artifacts at this level include support day-to-day design, testing, and documentation; surface risks and limitations; provide raw material for higher level oversight rather than deciding policy themselves (Batool et al., 2025; Kawakami et al., 2024; Kuehnert et al., 2025).

Batool et al. find no full “solutions” explicitly categorized at team level, highlighting a gap in formal governance artifacts at this level (Batool et al., 2025). These are mainly development-support and documentation artifacts rather than full governance frameworks.

Table 3. AI Governance Mechanisms and Artifacts at the Tactical Level

Tactical / team and project level		
	Governance Mechanisms	**Artifacts**
Structures	Project roles (model owners, data stewards, risk officers) and multidisciplinary AI teams (Batool et al., 2025; Papagiannidis et al., 2022; Schneider et al., 2020	**Documentation artifacts** Model cards, datasheets/data cards, transparency notes, Responsible AI impact assessments (Kawakami et al., 2024; Winecoff & Bogen, 2024) **Technical RAI tools**: Fairlearn, InterpretML, bias/robustness libraries, testing suites (Kawakami et al., 2024; Winecoff & Bogen, 2024; Pahune et al., 2025; Agarwal & Nene, 2025)
Processes	ML/AI development processes derived from CRISP-DM and software engineering, with added governance gates (reviews, validation, sign-off) (Papagiannidis et al., 2022; Schneider et al., 2020) Incident handling, change management, and continuous monitoring of deployed models (Papagiannidis et al., 2022; Schneider et al., 2020)	
Tools	Documentation tools and practices (model cards, data sheets, feature documentation) (Papagiannidis et al., 2022; Schneider et al., 2020) Testing, validation, and assurance procedures for ML systems; evaluation and audit protocols (Papagiannidis et al., 2022; Schneider et al., 2020; Reuel et al., 2024)	

Source: Authors' own analysis

Analytical Insights

The literature confirms that mapping artifacts by level × mechanism clarifies responsibilities but also exposes asymmetries. Strategic and operational levels are richly populated with structures (councils, committees) and policies, while explicitly team level "solutions" remain sparse.

Across levels, structures allocate who decides, processes define how AI is planned and controlled, and tools operationalize risk management, documentation, and assurance. Higher levels emphasize strategies and policies, while lower levels focus on lifecycle processes, technical controls, and concrete artifacts. Moving from tactical to strategic, artifacts shift from concrete, system-specific and lifecycle-bound to abstract, principle and policy oriented; their function shifts from doing and documenting, to coordinating and controlling, to setting direction and legitimizing AI governance across society (Batool et al., 2025; Birkstedt et al., 2023; Gasser & Almeida, 2017; Taeihagh, 2021; Wirtz et al., 2022; Kawakami et al., 2024; Kuehnert et al., 2025).

The two-dimensional mapping thus both systematizes a fragmented field and reveals level mechanism intersections where practice is underdeveloped, particularly tactical level governance processes and tools.

Frameworks and artifacts for AI governance at across organization levels

Overview of Multi-Level Governance Frameworks

Recent reviews converge on the need for structured frameworks that distinguish between strategic (macro/industry/national), operational (organizational/meso), and tactical (team/micro) levels of AI governance (Papagiannidis et al., 2025; Lu et al., 2022; Wirtz et al., 2022; Pinho et al., 2025). For example:

- The Responsible AI Pattern Catalogue classifies actionable patterns into industry-level (strategic), organization-level (operational), and team-level (tactical) categories (Lu et al., 2022).
- Ambidextrous frameworks integrate exploration (innovation/ethics) with exploitation (risk/compliance) across five layers: Governance Board (strategic), Strategic Alignment Layer (operational), Ambidextrous Layer bridging innovation/control (cross-cutting), Operational Layer (processes/controls), Compliance & Assurance Layer (Lestari et al., 2025; Wijaya et al., 2025).
- National initiatives like Canada's multi-program approach focus predominantly on strategic interventions but highlight gaps at operational/tactical levels (Attard-Frost et al., 2024).

Key Artifacts: Patterns, Documentation & Auditing Tools

Artifacts supporting multi-level governance include:

- Pattern catalogues offering best practices for system lifecycle management (Lu et al., 2022).
- Documentation frameworks enhancing transparency/accountability but facing integration barriers in workflows (Winecoff & Bogen, 2024).
- Auditing mechanisms, both technology-oriented (system properties) and process-oriented (organizational controls), are increasingly recognized as essential but require further standardization (Mökander, 2023).
- Risk-based integrative models match specific risks with tailored guidelines at each organizational layer (Wirtz et al., 2022).

Sectoral Adaptations & Regulatory Alignment

Sector-specific adaptations are evident:

- Finance: COBIT-based ambidextrous models balance innovation with compliance; ISO/IEC 42001 alignment is emphasized (Lestari et al., 2025; Wijaya et al., 2025).
- Healthcare: Emphasis on ethical audits, explainability requirements under EU AI Act/SaMD regulations; engagement of diverse stakeholders is critical (Mennella et al., 2024; Crossnohere et al., 2022; Palaniappan et al., 2024).
- Education/public sector: Living governance models map macro-meso-micro relationships; national strategies often lag behind technological advances (Pinho et al., 2025; Kim et al., 2025).

Regulatory convergence is seen around risk-based approaches, EU AI Act's tiered oversight model is widely referenced as a template for aligning strategic policy with operational/tactical implementation (Kim et al., 2025).

Implementation Challenges & Gaps

Common challenges include:

- Principles-to-practice gap: High-level ethics rarely translate into concrete controls without supporting artifacts/tools (Sadiq et al., 2025).
- Inclusivity: Global North perspectives dominate; underrepresented regions/stakeholders are often excluded from framework development (Roche et al., 2022; Sadiq et al., 2025).
- Adaptability: Rapid evolution of generative/agentic AI outpaces static regulatory or organizational controls; adaptive/lifecycle-based models are needed (Joshi, 2025; Gandhi et al., 2025).

Analytical Insights

Multi-level frameworks consistently endorse structured separation of strategic, operational, and tactical concerns, yet they differ in how fully they cover all cells of the 3×3 matrix. Pattern catalogues and ambidextrous models explicitly span multiple layers, but national initiatives and sectoral adaptations often concentrate on strategic or organizational interventions, leaving team-level implementation relatively under specified.

Artifacts such as documentation frameworks and auditing tools demonstrate a shift from principle-based to practice based governance, yet they face workflow and adoption barriers that limit their effectiveness in closing the principles-to-practice gap.

Regulatory convergence around risk-based models suggests a common backbone for aligning levels, but empirical evidence on real world integration across sectors and organization sizes remains limited.

AI governance frameworks and artifacts integration patterns

Systematic reviews categorize artifacts by team, organization, industry, national, international levels and emphasize that robust frameworks must deliberately connect these layers rather than treat artifacts in isolation (Batool et al., 2025). Multi-scale analyses of national AIG systems show that effective governance depends on coordination mechanisms that align artifacts (policies, tools, audits) across international, national, sectoral, and organizational scales (Attard-Frost & Lyons, 2024).

AI governance frameworks integrate artifacts by cascading principles downward and surfacing evidence upward across levels.

Cross-level integration patterns

Top-down translation (environmental → organizational → system)

Frameworks start from external mandates (laws, standards, ethics codes) and translate them into internal policies and concrete lifecycle artifacts.

- The hourglass model treats environmental requirements (e.g., AI Act, ethics guidelines) as inputs that organizations “process” into governance practices and then into AI-system-level tools and documentation (Mäntymäki et al., 2022).
- Five-layer frameworks similarly connect regulatory principles → standards → assessment methods → tools/metrics → certification, turning abstract requirements into testable artifacts (checklists, metrics, reporting templates) (Agarwal & Nene, 2025).

Bottom-up feedback (system → organizational → environment)

Operational artifacts (model cards, risk logs, incident reports) provide evidence that feeds back to higher layers.

- In the hourglass model, AI-system artifacts support portfolio oversight at the organizational layer and inform engagement with regulators and societal stakeholders (Mäntymäki et al., 2022).
- Incident reporting and fairness evaluations are explicitly used to refine standards and reveal gaps in legal or policy mandates (Agarwal & Nene, 2025).

Shared foundations plus local implementation

- The ARGO framework defines a central Shared Foundation (charter, common templates, triage tools) and an Advisory/Tooling layer (central RAI toolkits, training) that business units adapt in contextual local implementation (Meimandi et al., 2025).
- Organizational AI governance definitions stress integration with corporate, IT, and data governance, so AI-system artifacts reuse existing structures (e.g., risk committees, data stewardship) rather than standalone (Mäntymäki et al., 2022; Schneider et al., 2020).

Analytical Insights

Overall, leading AI governance frameworks integrate artifacts by: (1) cascading high level norms into concrete tools and documentation, (2) using operational artifacts as feedback to refine policies and standards, and (3) structuring shared organizational baselines that local teams adapt while remaining aligned with external regulatory and ethical requirements.

Cross level analyses show that effective governance depends less on individual artifacts and more on how artifacts are linked via top-down translation, bottom-up feedback, and shared foundations. Hourglass style and layered models exemplify this by turning external mandates into internal controls and using system level evidence to refine higher level norms.

However, coordination mechanisms themselves are under specified: frameworks rarely detail concrete processes for incident escalation, cross regime interoperability, or adaptive updating of artifacts as technologies evolve.

This suggests that future work should treat integration mechanisms (e.g., feedback loops, crosswalks, shared templates) as first class governance artifacts rather than implicit assumptions.

FINDINGS AND DISCUSSION

This review extends prior AI governance syntheses by systematically populating a two-dimensional 3×3 matrix of levels (strategic/operational/tactical) × mechanisms (structures/processes/tools), while earlier reviews either focused on level-based catalogues of artifacts or mechanism focused typologies without fully combining both dimensions.

Batool et al. (2025) classify AI governance artifacts by multiple levels (team, organization, industry, national, international) and artifact types (frameworks, tools, policies, models, guidelines), offering a rich inventory of artifacts but not a fully specified level × mechanism matrix. Papagiannidis et al. (2025) apply a structural–relational–procedural lens mapped onto organizational layers and identify best practices, barriers, and outcomes, yet they do not systematically populate all cells of a 3×3 level–mechanism space. Wirtz et al. propose a risk- and guideline-based integrative framework centered on risk categories and mitigation guidelines, rather than on the full spectrum of structures, processes, and tools across all governance levels. These contributions thus provide important but partial views on multi-level AI governance, which this review unifies by using a two-dimensional 3×3 construct (strategic/operational/tactical × structures/processes/tools) as its organizing backbone and systematically populating and assessing all level × mechanism intersections.

The following table 4 visually summarizes the asymmetric coverage of the 3×3 space: strategic and operational structures and processes are densely covered, operational tools are also well developed, whereas tactical processes and ‘full’ solutions remain underexplored relative to documentation and technical tools.

Table 4. Coverage matrix

Mechanisms / Operational Levels	Structures	Processes	Tools
Strategic	Densely covered	Densely covered	Moderately covered
Operational	Densely covered	Densely covered	Densely covered
Tactical	Moderately covered	Underexplored	Densely covered

Source: Authors' own analysis

RQ1 – Nature of coverage

Regarding RQ1 (mapping mechanisms across levels and types), our literature review shows that strategic and operational levels are richly populated with structures (e.g., ethics

councils, AI oversight units), processes (strategy-setting, lifecycle governance), and tools (risk-guideline models, documentation ecosystems), while tactical mechanisms are concentrated in documentation and technical evaluation tools rather than complete governance "solutions". Higher levels emphasize strategies and policies, while lower levels focus on lifecycle processes, technical controls, and concrete artifacts. Moving from tactical to strategic, artifacts shift from concrete, system-specific and lifecycle-bound to abstract, principle and policy oriented; their function shifts from doing and documenting, to coordinating and controlling, to setting direction and legitimizing AI governance across society (Batool et al., 2025; Birkstedt et al., 2023; Gasser & Almeida, 2017; Taeihagh, 2021; Wirtz et al., 2022; Kawakami et al., 2024; Kuehnert et al., 2025). This imbalance suggests that current governance practice emphasizes direction setting and coordination more than embedded, day-to-day control, leaving teams reliant on scattered documentation and testing tools rather than cohesive governance solutions.

RQ2 – From gaps to concrete agendas

Addressing RQ2 (underexplored intersections) the two-dimensional matrix highlights weak support for team/system level enforcement and accountability, organizational implementation processes, sectoral/national adaptive mechanisms, and international coordination and interoperability tools.

Team/system × enforcement & accountability

Most frameworks emphasize principles and risk lists, but give little guidance on concrete sanctions, redress, or liability allocation at project level (Birkstedt et al., 2023; Wirtz et al., 2022; Wirtz et al., 2020; Batool et al., 2025). Case-based work shows practices that "produce knowledge for decision making" but not clear escalation, whistleblowing, or user-level remedy paths tied to artifacts like logs or incident reports (Papagiannidis et al., 2022). Future work should design project-level enforcement artifacts that tie logs, model documentation, and incident reports directly to escalation paths, whistleblowing channels, and user-level remedy processes, clarifying who is liable for which failures at the system level. Programmatic agendas could include pilots that embed such artifacts into existing development workflows and empirically evaluate their impact on incident handling outcomes.

Organizational × process/implementation mechanisms

Systematic reviews highlight that implementation processes inside organizations are poorly specified: how committees use artifacts (model cards, risk registers), how decisions are documented, and how trade-offs are resolved over time (Birkstedt et al., 2023; Schneider et al., 2020; Papagiannidis et al., 2022; Batool et al., 2025). Even business-oriented frameworks

largely stay at “who/what is governed,” not at detailed workflow design, handoffs, and iteration (Schneider et al., 2020; Papagiannidis et al., 2022). Earlier IT-governance research points in the same direction. Kurti et al. (2014) showed that effective governance depends not only on formal structures but also on critical success factors linked to resource management and the human dimension, while Barolli and Kurti (2018) found that different organizational levels prioritize governance factors differently and warned that unmanaged divergence across levels can weaken alignment. These findings support the argument that research programs should develop detailed workflow blueprints that specify how committees use model cards, risk registers, and documentation in decision meetings, including handoffs, iteration cycles, and traceable trade-off records. Comparative case studies could test which process designs most effectively embed governance into everyday organizational routines rather than treating it as an ad hoc overlay.

Sectoral/national × adaptive & experimental mechanisms

Layered and regulatory frameworks stress static regulation and standards, while legal sandboxes, policy pilots, and iterative updating loops are only beginning to appear and lack formalization, particularly outside “frontier” or finance-like contexts (Agarwal & Nene, 2025; Zhong et al., 2025; Park, 2025; Kulothungan & Gupta, 2025). Energy and public sector frameworks call for lifecycle and KPI-based adaptation but provide few reusable artifacts (e.g., standardized learning reviews, cross-case comparison tools) (Wirtz et al., 2022; Park, 2025). Future agendas should prototype sectoral sandboxes and policy pilots that include reusable artifacts (iteration templates, learning review formats, KPI dashboards) to formalize how regulatory regimes update in response to evidence from deployed AI systems. Cross-sector programs could compare different adaptive designs to identify which mechanisms most effectively keep sectoral and national governance aligned with rapidly evolving AI technologies.

International/multi-level × coordination & interoperability

Global analyses call for polycentric, nested governance yet note missing mechanisms for artifact interoperability, e.g., how risk tiers, audit reports, or incident taxonomies translate across the US–EU–Asia regimes or among multiple international bodies (Zhong et al., 2025; Kulothungan & Gupta, 2025; Olugbade, 2025). Crosswalks between major frameworks (EU AI Act, NIST RMF, sectoral standards) are largely conceptual, not artifact-level (Agarwal & Nene, 2025; Ribeiro et al., 2025; Kulothungan & Gupta, 2025; Batool et al., 2025). Research and policy programs should cocreate interoperability artifacts, such as cross-walks between risk tiers, shared incident taxonomies, and portable audit report schemas, to make governance tools translatable across jurisdictions and regimes. Coordinated pilots involving multiple regulators

and standards bodies could empirically test how such artifacts support vertically integrated, polycentric AI governance in practice

RQ3 – Effectiveness and empirical deficit

In response to RQ3 (effectiveness and practical impact), available evidence suggests that pattern catalogues, risk-based frameworks, documentation standards and auditing tools are promising but face adoption, complexity, and context-fit barriers. Frameworks such as the Responsible AI Pattern Catalogue provide systematic guidance across organizational layers but require further empirical validation in diverse contexts (Lu et al., 2022). Risk-based integrative models offer comprehensive coverage but may be too complex or resource intensive for smaller organizations or those outside highly regulated sectors (Wirtz et al., 2022). Documentation standards enhance transparency yet face adoption barriers due to workflow misalignment or lack of incentives (Winecoff & Bogen, 2024). Regulatory convergence around risk tiered oversight is promising but lags behind technological innovation, especially with generative/agentic systems requiring adaptive controls beyond static checklists or policies (Joshi, 2025; Gandhi et al., 2025). Notably absent are robust mechanisms for including marginalized voices or tailoring frameworks to local contexts, a gap highlighted by critiques of Euro-American dominance in policy discourse (Roche et al., 2022; Sadiq et al., 2025). There is also a shortage of empirical studies evaluating real world effectiveness of proposed artifacts or documenting cross-sectoral best practices. Overall, the conceptual maturity of AI governance frameworks currently outpaces their evaluated effectiveness, so this review should be read as mapping a design space and hypothesis set rather than providing definitive guidance on “what works”.

The two-dimensional organization of literature, by level and mechanism, offers several advantages:

Clarity: It helps distinguish between who is responsible for what at each level versus how those responsibilities are enacted through structures/processes/tools (Karataş & Çakır, 2023; Batool et al., 2025).

Comprehensiveness: It ensures that all relevant aspects are considered rather than focusing solely on one dimension (e.g., only strategic policy or only technical tools) (Karataş & Çakır, 2023).

Gap Identification: It reveals underexplored intersections, for example, tactical-level tools or operational-level relational processes, which may be overlooked in single-axis reviews (Batool et al., 2025).

Implementation Guidance: Practitioners can better map their own organizations' needs against a matrix of possible interventions at each level/mechanism intersection (Papagiannidis et al., 2022).

Recent reviews argue that this multidimensional view is especially valuable as organizations move from principle-based to practice-based AI governance, and as regulatory requirements become more granular across sectors (Batool et al., 2025; Papagiannidis et al., 2025).

RECOMMENDATIONS

Based on the above findings and discussion, organizations should prioritize four recommendation areas: team-level accountability, organizational workflow design, adaptive sectoral governance, and cross-jurisdiction interoperability.

This study recommends that future AI governance efforts prioritize the weakest cells in the level × mechanism matrix rather than adding more high-level principles alone. The literature indicates that team-level enforcement and accountability remain weakly specified, so organizations should develop project-level artifacts that connect logs, model documentation, and incident reports to escalation paths, whistleblowing channels, and user remedy processes. Empirical pilots should test whether embedding these artifacts into existing development workflows improves incident handling and clarifies liability at the system level.

At the organizational level, governance frameworks should specify how committees use model cards, risk registers, and documentation in decision making, because implementation workflows, handoffs, and trade-off resolution processes remain poorly defined. Comparative case studies should evaluate which workflow designs best embed governance into routine organizational practice rather than treating it as an ad hoc compliance overlay.

Sectoral and national governance should become more adaptive and experimental, since static regulation and standards lag rapidly evolving AI systems. Reusable artifacts such as sandbox protocols, iteration templates, learning review formats, and KPI dashboards should be developed to formalize governance updates in response to deployment evidence.

At the international level, regulators and standards bodies should co-develop interoperability artifacts such as crosswalks between risk tiers, shared incident taxonomies, and portable audit-report schemas to support polycentric, vertically coordinated governance across jurisdictions.

These recommendations are necessary because current AI governance literature is conceptually mature but still lacks strong empirical validation of what works in practice.

CONCLUSION

Multi-level frameworks for AI governance, distinguishing between strategic policy-setting bodies, operational organizational processes, and tactical project/team controls, are well-established in recent literature. Actionable artifacts such as pattern catalogues, risk management tools, documentation standards, and auditing procedures are increasingly available to bridge the principles-to-practice gap across sectors. However, persistent challenges remain regarding inclusivity of diverse perspectives, adaptability to rapidly evolving technologies like generative/agentic AI, empirical validation in real-world settings, and effective translation from high-level ethics to daily operations.

Several foundational works in IT/AI governance propose organizing mechanisms by both level (strategic/operational/tactical) and mechanism type (structures/processes/tools), often referencing De Haes & Van Grembergen's triad (Karataş & Çakır, 2023; Bhaskaran & Jaafar, 2022; Haes & Grembergen, 2004). Recent systematic reviews explicitly recommend this approach for clarity and completeness (Karataş & Çakır, 2023; Batool et al., 2025). Karataş & Çakır (Karataş & Çakır, 2023) systematically review IT governance by mapping structures (e.g., committees), processes (e.g., planning), and relational mechanisms across levels. Batool et al. (Batool et al., 2025) classify AI governance artifacts by team, organization, industry, national, and international levels while distinguishing between frameworks (structure), policies/processes (process), and technical tools. Papagiannidis et al. (2022) use a structural–relational–procedural lens mapped onto organizational layers.

Our work shows that organizing AI governance by levels (strategic, operational, tactical) and mechanism types (structures, processes, tools) clarifies who is responsible for what and how those responsibilities are enacted in practice, while bringing together otherwise fragmented work on policies, processes, and technical artifacts.

Applying the construct proposed here, the current literature reveals rich coverage at strategic and organizational levels and a growing ecosystem of artifacts, pattern catalogues, risk models, documentation standards, and auditing tools, plus recurring integration patterns of top-down translation, bottom-up feedback, and shared foundations with local implementation.

The two-dimensional mapping highlights four particularly weakly supported intersections: (a) team/system × enforcement & accountability, (b) organizational × process/implementation, (c) sectoral/national × adaptive & experimental mechanisms, and (d) international/multi-level × coordination & interoperability. These gaps indicate where new artifacts and workflows are most urgently needed.

Organizing the literature on AI governance by both level (strategic/operational/tactical) and mechanism type (structures/processes/tools) offers a powerful lens for organizing both

scholarship and practice in AI governance but requires further empirical study to realize its full potential.

The literature converges that current framework over support top-down principles and taxonomies, and under support bottom-up evidence flows, concrete enforcement, adaptive experimentation, and cross regime interoperability at specific organizational and governance levels.

LIMITATIONS AND FUTURE RESEARCH

This review has several limitations. First, the search was restricted to the 50 most relevant papers, which may bias coverage toward highly cited or recent work and underrepresent grey literature and practice reports. Second, only English-language publications were analyzed, reinforcing the existing dominance of Global North perspectives in AI governance debates. Third, much of the underlying literature is conceptual or framework-oriented, with limited empirical evaluation of the effectiveness of specific mechanisms or integration patterns in real organizations. Last, using Consensus improved breadth and efficiency in identifying candidate studies, but AI-assisted search tools can show inconsistent recall and selection bias, so all outputs were manually verified and should be interpreted as supporting, rather than replacing, conventional systematic search procedures (Tosi, 2025; Mogoale et al., 2025; Sušnjak et al., 2024).

Future research should empirically test two-dimensional models in diverse sectors/geographies, especially within the organizational × process/implementation intersection where concrete workflows remain weakly specified. Future work should develop guidance for underexplored intersections (e.g., tactical-processes), thereby strengthening the team/system × enforcement & accountability cell through project-level controls and escalation paths. Research should design and evaluate adaptive and experimental governance mechanisms (e.g., sandboxes, policy pilots), directly addressing the sectoral/national × adaptive & experimental mechanisms gap. Finally, work on cross-regime coordination and interoperability tools should target the international/multi-level × coordination & interoperability intersection through shared taxonomies, crosswalks, and portable audit schemas.

REFERENCES

Agarwal, A., & Nene, M. (2025). A five-layer framework for AI governance: integrating regulation, standards, and certification. ArXiv, abs/2509.11332. https://doi.org/10.1108/tg-03-2025-0065

Alreemy, Z., Chang, V., Walters, R., & Wills, G. (2016). Critical success factors (CSFs) for information technology governance (ITG). Int. J. Inf. Manag., 36, 907-916. https://doi.org/10.1016/j.ijinfomgt.2016.05.017

Attard-Frost, B., & Lyons, K. (2024). AI governance systems: a multi-scale analysis framework, empirical findings, and future directions. AI and Ethics, 5, 2557 - 2604. https://doi.org/10.1007/s43681-024-00569-5

Attard-Frost, B., Brandusescu, A., & Lyons, K. (2024). The governance of artificial intelligence in Canada: Findings and opportunities from a review of 84 AI governance initiatives. Gov. Inf. Q., 41, 101929. https://doi.org/10.1016/j.giq.2024.101929

Barolli, E., & Kurti, I. (2018). Going beyond: Effective information technology governance across organizational levels. CBU International Conference Proceedings, 6, 29–39. https://doi.org/10.12955/cbup.v6.1129

Batool, A., Zowghi, D., & Bano, M. (2025). AI governance: a systematic literature review. AI and Ethics, 5, 3265 - 3279. https://doi.org/10.1007/s43681-024-00653-w

Bernard, N., Sagawa, Y., Bier, N., Lihoreau, T., Pazart, L., & Tannou, T. (2025). Using artificial intelligence for systematic review: the example of elicit. BMC Medical Research Methodology, 25. https://doi.org/10.1186/s12874-025-02528-y

Bhaskaran, A., & Jaafar, N. (2022). IT Governance Practices for The Success of IT Initiatives – A Conceptual Framework. International Journal of Business and Management. https://doi.org/10.26666/rmp.ijbm.2022.1.1

Birkstedt, T., Minkkinen, M., Tandon, A., & Mäntymäki, M. (2023). AI governance: themes, knowledge gaps and future agendas. Internet Res., 33, 133-167. https://doi.org/10.1108/intr-01-2022-0042

Bolanos, F., Salatino, A., Osborne, F., & Motta, E. (2024). Artificial intelligence for literature reviews: opportunities and challenges. Artificial Intelligence Review, 57. https://doi.org/10.1007/s10462-024-10902-3

Crossnohere, N., Elsaid, M., Paskett, J., Bose-Brill, S., & Bridges, J. (2022). Guidelines for Artificial Intelligence in Medicine: Literature Review and Content Analysis of Frameworks. Journal of Medical Internet Research, 24. https://doi.org/10.2196/36823

De Almeida, P., & Júnior, C. (2025). Artificial intelligence governance: Understanding how public organizations implement it. Gov. Inf. Q., 42, 102003. https://doi.org/10.1016/j.giq.2024.102003

De La Torre-López, J., Ramírez, A., & Romero, J. (2023). Artificial intelligence to automate the systematic review of scientific literature. Computing, 105, 2171 - 2194. https://doi.org/10.1007/s00607-023-01181-x

Fabiano, N., Gupta, A., Bhambra, N., Luu, B., Wong, S., Maaz, M., Fiedorowicz, J. G., Smith, A. L., & Solmi, M. (2024). How to optimize the systematic review process using AI tools. JCPP Advances, 4. https://doi.org/10.1002/jcv2.12234

Gandhi, D., Joshi, H., Hartman, L., & Hassani, S. (2025). Approaches to Responsible Governance of GenAI in Organizations : Peer-Reviewed and accepted in IEEE-ISTAS 2025. 2025 IEEE International Symposium on Technology and Society (ISTAS), 1-15. https://doi.org/10.1109/istas65609.2025.11269657

Gasser, U., & Almeida, V. (2017). A Layered Model for AI Governance. IEEE Internet Computing, 21, 58-62. https://doi.org/10.1109/mic.2017.4180835

Haes, S., & Grembergen, W. (2004). IT Governance and Its Mechanisms. Available online at https://static.aminer.org/pdf/PDF/000/245/098/introduction_to_the_minitrack_it_governance_and_its_mechanisms.pdf

Hilb, M. (2020). Toward artificial governance? The role of artificial intelligence in shaping the future of corporate governance. Journal of Management and Governance, 24, 851 - 870. https://doi.org/10.1007/s10997-020-09519-9

Hussein, R., Zink, A., Ramadan, B., Howard, F., Hightower, M., Shah, S., & Beaulieu-Jones, B. (2024). Advancing Healthcare AI Governance: A Comprehensive Maturity Model Based on Systematic Review. **. https://doi.org/10.1101/2024.12.30.24319785

Ilori, O., Nwosu, N., & Naiho, H. (2024). A comprehensive review of it governance: effective implementation of COBIT and ITIL frameworks in financial institutions. Computer Science & IT Research Journal. https://doi.org/10.51594/csitrj.v5i6.1224

Joshi, S. (2025). AI Governance in the Era of Agentic Generative AI and AGI: Frameworks, Risks, and Policy Directions. International Journal of Innovative Research in Computer Science and Technology. https://doi.org/10.55524/ijircst.2025.13.5.3

Karataş, M., & Çakır, H. (2023). A Systematic Literature Review on IT Governance Mechanisms and Frameworks. Journal of Learning and Teaching in Digital Age. https://doi.org/10.53850/joltida.1300262

Kawakami, A., Wilkinson, D., & Chouldechova, A. (2024). Do Responsible AI Artifacts Advance Stakeholder Goals? Four Key Barriers Perceived by Legal and Civil Stakeholders. ArXiv, abs/2408.12047. https://doi.org/10.48550/arxiv.2408.12047

Kim, B., Jeong, S., Cho, B., & Chung, J. (2025). AI Governance in the Context of the EU AI Act. IEEE Access, 13, 144126-144142. https://doi.org/10.1109/access.2025.3598023

Kim, B., Jeong, S., Cho, B., & Chung, J. (2025). AI Governance in the Context of the EU AI Act: A Bibliometric and Literature Review Approach. ArXiv, abs/2502.03468. https://doi.org/10.48550/arxiv.2502.03468

Kuehnert, B., Kim, R., Forlizzi, J., & Heidari, H. (2025). The Who'', What'', and ``How'' of Responsible AI Governance: A Systematic Review and Meta-Analysis of (Actor, Stage)-Specific Tools. Proceedings of the 2025 ACM Conference on Fairness, Accountability, and Transparency. https://doi.org/10.1145/3715275.3732191

Kulothungan, V., & Gupta, D. (2025). Towards Adaptive AI Governance: Comparative Insights from the U.S., EU, and Asia. 2025 IEEE 11th Conference on Big Data Security on Cloud (BigDataSecurity), 32-38. https://doi.org/10.1109/bigdatasecurity66063.2025.00018

Kurti, I., Barolli, E., & Sevrani, K. (2014). Effective IT governance in the Albanian public sector: A critical success factors approach. The Electronic Journal of Information Systems in Developing Countries, 63(6), 1–22. https://doi.org/10.1002/j.1681-4835.2014.tb00451.x

Lestari, M., Wijaya, A., Puspita, M., & V. (2025). Designing Ambidextrous AI Governance for Digital Transformation in Fintech Sector. Jurnal Teknologi dan Manajemen Industri Terapan. https://doi.org/10.55826/jtmit.v4i3.1042

Li, B., Qi, P., Liu, B., Di, S., Liu, J., Pei, J., Yi, J., & Zhou, B. (2021). Trustworthy AI: From Principles to Practices. ACM Computing Surveys, 55, 1 - 46. https://doi.org/10.1145/3555803

Lu, Q., Zhu, L., Xu, X., Whittle, J., Zowghi, D., & Jacquet, A. (2022). Responsible AI Pattern Catalogue: A Collection of Best Practices for AI Governance and Engineering. ACM Computing Surveys, 56, 1 - 35. https://doi.org/10.1145/3626234

Malik, F. S., & Terzidis, O. (2025). A hybrid framework for creating artificial intelligence-augmented systematic literature reviews. Management Review Quarterly. https://doi.org/10.1007/s11301-025-00522-8

Mäntymäki, M., Minkkinen, M., Birkstedt, T., & Viljanen, M. (2022). Defining organizational AI governance. AI and Ethics, 2, 603-609. https://doi.org/10.1007/s43681-022-00143-x

Mäntymäki, M., Minkkinen, M., Birkstedt, T., & Viljanen, M. (2022a). Putting AI Ethics into Practice: The Hourglass Model of Organizational AI Governance. ArXiv, abs/2206.00335. https://doi.org/10.48550/arxiv.2206.00335

Meimandi, K., Reuel, A., Aranguiz-Dias, G., Rahama, H., Ayadi, A., Boullier, X., Verdo, J., Montanie, L., & Kochenderfer, M. (2025). An Adaptive Responsible AI Governance Framework for Decentralized Organizations. ArXiv, abs/2510.03368. https://doi.org/10.1609/aies.v8i2.36633

Mennella, C., Maniscalco, U., De Pietro, G., & Esposito, M. (2024). Ethical and regulatory challenges of AI technologies in healthcare: A narrative review. Heliyon, 10. https://doi.org/10.1016/j.heliyon.2024.e26297

Mikalef, P., Lemmer, K., Schaefer, C., Ylinen, M., Fjørtoft, S., Torvatn, H., Gupta, M., & Niehaves, B. (2023). Examining how AI capabilities can foster organizational performance in public organizations. Gov. Inf. Q., 40, 101797. https://doi.org/10.1016/j.giq.2022.101797

Mogoale, P., Pretorius, A. B., Mogase, R., & Segooa, M. (2025). Evaluating the Efficacy of AI Tools in Systematic Literature Reviews: A Comprehensive Analysis. Journal of Information Systems and Informatics. https://doi.org/10.51519/journalisi.v7i1.1035

Mökander, J. (2023). Auditing of AI: Legal, Ethical and Technical Approaches. Digital Society, 2. https://doi.org/10.1007/s44206-023-00074-y

Nguyen, H., & Kanbach, D. (2023). Toward a view of integrating corporate sustainability into strategy: A systematic literature review. Corporate Social Responsibility and Environmental Management. https://doi.org/10.1002/csr.2611

Oguru, M. (2025). The Role of IT Governance Frameworks in Enhancing Organisational Cyber-Resilience. Asian Journal of Advanced Research and Reports. https://doi.org/10.9734/ajarr/2025/v19i101173

Olugbade, O. (2025). In search of a global governance mechanism for Artificial Intelligence (AI): a collective action perspective. Global Public Policy and Governance, 5, 139 - 161. https://doi.org/10.1007/s43508-025-00113-z

Pahune, S., Akhtar, Z., Mandapati, V., & Siddique, K. (2025). The Importance of AI Data Governance in Large Language Models. Big Data Cogn. Comput., 9, 147. https://doi.org/10.3390/bdcc9060147

Palaniappan, K., Lin, E., & Vogel, S. (2024). Global Regulatory Frameworks for the Use of Artificial Intelligence (AI) in the Healthcare Services Sector. Healthcare, 12. https://doi.org/10.3390/healthcare12050562

Papagiannidis, E., Enholm, I., Dremel, C., Mikalef, P., & Krogstie, J. (2022). Toward AI Governance: Identifying Best Practices and Potential Barriers and Outcomes. Information Systems Frontiers, 25, 123 - 141. https://doi.org/10.1007/s10796-022-10251-y

Papagiannidis, E., Mikalef, P., & Conboy, K. (2025). Responsible artificial intelligence governance: A review and research framework. J. Strateg. Inf. Syst., 34, 101885. https://doi.org/10.1016/j.jsis.2024.101885

Papyshev, G., & Yarime, M. (2023). The state's role in governing artificial intelligence: development, control, and promotion through national strategies. Policy Design and Practice, 6, 79 - 102. https://doi.org/10.1080/25741292.2022.2162252

Park, C. (2025). Addressing Challenges for the Effective Adoption of Artificial Intelligence in the Energy Sector. Sustainability. https://doi.org/10.3390/su17135764

Peterson, R. (2004). Crafting Information Technology Governance. Information Systems Management, 21, 22 - 7. https://doi.org/10.1201/1078/44705.21.4.20040901/84183.2

Pinho, I., Costa, A., & Pinho, C. (2025). Generative AI Governance Model in Educational Research. Frontiers in Education. https://doi.org/10.3389/feduc.2025.1594343

Radu, R. (2021). Steering the governance of artificial intelligence: national strategies in perspective. Policy and Society, 40, 178 - 193. https://doi.org/10.1080/14494035.2021.1929728

Reuel, A., Bucknall, B., Casper, S., Fist, T., Soder, L., Aarne, O., Hammond, L., Ibrahim, L., Chan, A., Wills, P., Anderljung, M., Garfinkel, B., Heim, L., Trask, A., Mukobi, G., Schaeffer, R., Baker, M., Hooker, S., Solaiman, I., Luccioni, A., Rajkumar, N., Moes, N., Ladish, J., Guha, N., Newman, J., Bengio, Y., South, T., Pentland, A., Koyejo, S., Kochenderfer, M., & Trager, R. (2024). Open Problems in Technical AI Governance. ArXiv, abs/2407.14981. https://doi.org/10.48550/arxiv.2407.14981

Ribeiro, D., Rocha, T., Pinto, G., Cartaxo, B., Amaral, M., Davila, N., & Camargo, A. (2025). Toward Effective AI Governance: A Review of Principles. ArXiv, abs/2505.23417. https://doi.org/10.48550/arxiv.2505.23417

Ridzuan, N., Masri, M., Anshari, M., Fitriyani, N., & Syafrudin, M. (2024). AI in the Financial Sector: The Line between Innovation, Regulation and Ethical Responsibility. Inf., 15, 432. https://doi.org/10.3390/info15080432

Robles, P., & Mallinson, D. (2023). Catching up with AI : Pushing toward a cohesive governance framework. Politics & Policy. https://doi.org/10.1111/polp.12529

Roche, C., Wall, P., & Lewis, D. (2022). Ethics and diversity in artificial intelligence policies, strategies and initiatives. Ai and Ethics, 1 - 21. https://doi.org/10.1007/s43681-022-00218-9

Sadiq, R., Yasser, F., & Nawaz, F. (2025). Designing Ethical AI Governance in Sustainable Finance Ecosystems. Advance Journal of Econometrics and Finance. https://doi.org/10.63075/20x6kb11

Sami, M. A., Rasheed, Z., Kemell, K.-K., Waseem, M., Kilamo, T., Saari, M., Nguyen-Duc, A., Systä, K., & Abrahamsson, P. (2024). System for systematic literature review using multiple AI agents: Concept and an empirical evaluation. ArXiv, abs/2403.08399. https://doi.org/10.48550/arxiv.2403.08399

Schmitt, L. (2021). Mapping global AI governance: a nascent regime in a fragmented landscape. AI and Ethics, 2, 303 - 314. https://doi.org/10.1007/s43681-021-00083-y

Schneider, J., Abraham, R., Meske, C., & Brocke, J. (2020). Artificial Intelligence Governance For Businesses. Information Systems Management, 40, 229 - 249. https://doi.org/10.1080/10580530.2022.2085825

Shabbir, M. (2025). Corporate Sustainability Reimagined: A Bibliometric–Systematic Literature Review of Governance, Technology, and Stakeholder-Driven Strategies for SDG Impact. Business Strategy and the Environment. https://doi.org/10.1002/bse.70070

Shafiabady, N., Hadjinicolaou, N., Din, F., Bhandari, B., Wu, R., & Vakilian, J. (2023). Using Artificial Intelligence (AI) to predict organizational agility. PLOS ONE, 18. https://doi.org/10.1371/journal.pone.0283066

Shahzaib, R., Latif, F., & Ali, S. (2025). The Role of Intelligent AI Agents in Optimizing Business Management and Decision-Making Processes. Research Journal for Social Affairs. https://doi.org/10.71317/rjsa.003.05.0413

Suresh, N., Varalakshmi, T., & Chand, M. (2024). IT Governance Framework Ensuring Effective Management and Compliance. International Research Journal on Advanced Engineering and Management (IRJAEM). https://doi.org/10.47392/irjaem.2024.0227

Sušnjak, T., Hwang, P., Reyes, N., Barczak, A., Mcintosh, T. R., & Ranathunga, S. (2024). Automating Research Synthesis with Domain-Specific Large Language Model Fine-Tuning. ACM Transactions on Knowledge Discovery from Data, 19, 1 - 39. https://doi.org/10.1145/3715964

Taeihagh, A. (2021). Governance of artificial intelligence. Policy and Society, 40, 137 - 157. https://doi.org/10.1080/14494035.2021.1928377

Tosi, D. (2025). Comparing Generative AI Literature Reviews Versus Human-Led Systematic Literature Reviews: A Case Study on Big Data Research. IEEE Access, 13, 56210-56219. https://doi.org/10.1109/access.2025.3554504

Veale, M., Matus, K., & Gorwa, R. (2023). AI and Global Governance: Modalities, Rationales, Tensions. Annual Review of Law and Social Science. https://doi.org/10.1146/annurev-lawsocsci-020223-040749

Wijaya, A., Subiyakto, A., Julians, A., Lestari, M., & Warella, G. (2025). An Ambidextrous AI Governance Framework for Smart Cities to Enhance IT Governance and Data Security. Jurnal Teknologi dan Manajemen Industri Terapan. https://doi.org/10.55826/jtmit.v4i2.1082

Winecoff, A., & Bogen, M. (2024). Improving Governance Outcomes Through AI Documentation: Bridging Theory and Practice. Proceedings of the 2025 CHI Conference on Human Factors in Computing Systems. https://doi.org/10.1145/3706598.3713814

Wirtz, B., Weyerer, J., & Kehl, I. (2022). Governance of artificial intelligence: A risk and guideline-based integrative framework. Gov. Inf. Q., 39, 101685. https://doi.org/10.1016/j.giq.2022.101685

Wirtz, B., Weyerer, J., & Sturm, B. (2020). The Dark Sides of Artificial Intelligence: An Integrated AI Governance Framework for Public Administration. International Journal of Public Administration, 43, 818 - 829. https://doi.org/10.1080/01900692.2020.1749851

Zhong, H., , T., Jie, Y., Neuwirth, R., & Shen, H. (2025). Global AI Governance: Where the Challenge is the Solution-An Interdisciplinary, Multilateral, and Vertically Coordinated Approach. ArXiv, abs/2503.04766. https://doi.org/10.48550/arxiv.2503.04766