

GOVERNING ARTIFICIAL INTELLIGENCE FOR SUSTAINABLE TERRITORIAL DEVELOPMENT.

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Abstract

This paper examines AI governance as a strategic institutional force shaping sustainable territorial development. Using a Systematic Literature Review (SLR) following the PRISMA protocol, we searched Scopus, Web of Science, and ScienceDirect for peer-reviewed English-language publications from 2018 to 2024. After identification (n = 1,847), duplicate removal (n = 423), title/abstract screening (n = 1,424 screened; n = 987 excluded), and full-text eligibility assessment (n = 437 assessed; n = 310 excluded), a final corpus of 127 articles was retained. The results reveal that effective AI governance—anchored in multi-level institutional coordination, responsible algorithmic deployment, equitable data infrastructure, and participatory mechanisms—can advance sustainable territorial outcomes while reducing socio-spatial inequalities. However, significant territorial disparities in governance capacity and AI preparedness persist. The paper contributes theoretically by elucidating the relationships between AI governance mechanisms, responsible AI practices, and territorial sustainability outcomes; methodologically by operationalising a transparent and reproducible PRISMA protocol; and practically by proposing a testable conceptual framework and actionable policy recommendations for regional authorities and urban planners.

Keywords: Artificial intelligence governance; sustainable territorial development; responsible AI; multi-level gover; digital transformation; territorial innovation; data governance

1 INTRODUCTION

Artificial intelligence (AI) governance has emerged as a central institutional challenge of the digital era, encompassing regulatory, ethical, spatial, and socio-economic dimensions. It provides territories with adaptive capacity to navigate complex and rapidly changing technological environments (Moe & Størksen, 2022; Camilleri, 2024). Its strategic relevance has grown considerably as digital acceleration, decarbonisation commitments, and mounting governance demands redefine the conditions for territorial competitiveness, social equity, and environmental resilience (Vinuesa et al., 2020; Roberts et al., 2024).

Sustainable territorial development has become a central paradigm of regional and urban policy, emphasising the need to balance economic growth, social inclusion, and environmental integrity across heterogeneous spatial contexts (Pike et al., 2017; Rodríguez-Pose, 2020). A growing body of literature warns against deploying digital technologies without adequate governance safeguards, showing that AI systems can encode normative assumptions that when left ungoverned reproduce historical inequalities (Sadowski, 2019; Moon, 2023). AI governance is therefore no longer a purely technical matter; it is an organisational, institutional, and spatial phenomenon arising from interactions among public authorities, technology firms, research institutions, and citizens across territorial scales (European Committee of the Regions, 2024; Roberts et al., 2024).

Despite growing recognition of AI governance as an institutional driver of sustainable development, the literature remains fragmented. Studies tend to address governance and territorial sustainability separately, or focus narrowly on ethics, regulation, or smart city technology, without a holistic account of how governance mechanisms condition sustainable territorial trajectories (Moe & Størksen, 2022; Năstasă & Dumitra, 2024). This fragmentation constitutes the research gap this study addresses.

The central research question is: how, and through what mechanisms, does AI governance act as a constitutive driver of sustainable territorial development, beyond technocentric solutions? More precisely, the study seeks to identify the governance mechanisms, multi-actor coordination structures, and institutional preconditions that enable territories to deploy AI in contextually appropriate, long-term sustainability-oriented, and socially inclusive ways.

To address this question, the paper conducts a Systematic Literature Review (SLR) following the PRISMA protocol (Page et al., 2021), locating, assessing, and synthesising scholarship from major international databases. In doing so, it unifies fragmented contributions and proposes an

analytical framework for understanding the AI governance–territorial development nexus, along with six empirically testable propositions.

The paper is structured as follows: Section 2 develops the conceptual foundations; Section 3 details the PRISMA methodology; Section 4 presents quantitative and thematic results; Section 5 provides an analytical discussion; Section 6 proposes the conceptual framework; Sections 7 and 8 address practical implications and conclusions.

2 CONCEPTUALISATION

2.1 ARTIFICIAL INTELLIGENCE GOVERNANCE

AI governance refers to the ensemble of rules, institutions, and practices that guide the design, deployment, monitoring, and accountability of AI systems. It operates across four analytically distinct but interconnected dimensions. First, regulatory governance encompasses formal legal frameworks such as the EU AI Act (2024). Second, institutional governance concerns how public and private organisations coordinate on AI strategies. Third, ethical governance ensures AI systems respect principles of fairness, non-discrimination, and human dignity. Fourth, algorithmic governance focuses on the technical requirements of transparency, explainability, and accountability.

These dimensions are mutually constitutive: regulatory frameworks define the legal architecture within which institutional governance operates; ethical and algorithmic governance translate normative principles into system-level accountability. As AI becomes more deeply integrated into public services and spatial planning, the capacity to govern it across all four dimensions becomes a critical institutional competence.

Data governance is an indispensable component: it ensures the availability, quality, and interoperability of AI data inputs while protecting against misuse (Sadowski, 2019). Participatory mechanisms ensure that those affected by AI-driven decisions have a voice in their oversight. Multi-level governance coordinates decision-making across national, regional, and local scales—addressing the challenge that AI decisions made at higher levels often produce consequences at the local level (European Committee of the Regions, 2024).

2.2 SUSTAINABLE TERRITORIAL DEVELOPMENT

Sustainable territorial development denotes a place-based strategy for balanced development that is economically productive, socially inclusive, and environmentally sound meeting present needs without compromising future capacity (World Commission on Environment and Development, 1987; Pike et al., 2017). It encompasses five interrelated dimensions: (1) economic productive capacity for shared prosperity; (2) social equity, community cohesion,

and service access; (3) environmental sustainable resource management; (4) institutional governance quality, capacity, and accountability; and (5) spatial physical organisation of territory, infrastructure, and land use.

Territories with strong innovation foundations are better positioned to leverage AI while managing its risks (European Committee of the Regions, 2024; Coll Berini et al., 2025). Conversely, territories with weak innovation capacities face a dual risk: failing to capture AI's economic benefits while remaining more exposed to its distributional and environmental harms. This territorial divergence constitutes one of the central governance challenges identified in the reviewed literature.

2.3 AI GOVERNANCE AND SUSTAINABLE TERRITORIAL DEVELOPMENT

The relationship between AI governance and sustainable territorial development operates through two complementary logics. The constitutive logic holds that effective governance grounded in transparency, accountability, and participation enables local authorities to deploy AI in ways aligned with territorial values and long-term development goals. When governed appropriately, AI can enhance the quality of territorial decisions by processing complex spatial, economic, and environmental data that traditional planning tools cannot handle.

The disruptive logic holds that AI deployed in contexts of weak governance can produce harmful territorial outcomes: non-transparent algorithmic systems may embed historical biases in public resource allocation, concentrate AI capabilities in metropolitan centres, disadvantage peripheral communities, and generate significant environmental externalities through energy-intensive infrastructure (Bender et al., 2021; Wu et al., 2022). These harms are the product of inadequate governance, not of AI technology per se. How territories govern AI is therefore as consequential for sustainable development as whether they deploy it.

3 METHODOLOGY

The present study adopts a Systematic Literature Review (SLR) methodology to examine how AI governance drives sustainable territorial development. The SLR provides a rigorous and transparent protocol for identifying, assessing, and synthesising scholarly evidence on complex and interdisciplinary phenomena (Tranfield et al., 2003; Page et al., 2021). It enables the integration of dispersed contributions from territorial development science, governance research, AI ethics, and regional studies into a coherent analytical framework (Pittaway et al., 2014).

The review covers 2018–2024. Three international databases Scopus, ScienceDirect, and Web of Science were systematically searched. The search strings combined three conceptual clusters

connected by Boolean AND operators: (1) "artificial intelligence" OR "AI governance" OR "responsible AI" OR "algorithmic governance"; (2) "governance" OR "regulation" OR "ethics" OR "data governance" OR "multi-level governance" OR "public policy"; and (3) "territorial development" OR "sustainable development" OR "regional development" OR "smart city" OR "spatial planning" OR "territorial sustainability".

The selection process followed the four-stage PRISMA protocol (Page et al., 2021) as detailed below and illustrated in Figure 1.

Identification: Database searches yielded 1,847 records (Scopus: n = 812; Web of Science: n = 617; ScienceDirect: n = 418). After removing 423 duplicates, 1,424 unique records were carried forward.

Screening: All 1,424 records were screened by title and abstract. Records exclusively focused on technical AI applications without governance analysis, non-English publications, and studies without territorial or sustainability relevance were excluded. A total of 987 records were excluded, leaving 437 for full-text assessment.

Eligibility: Full texts of 437 articles were assessed. Studies were included if they: (i) addressed AI governance in relation to territorial, regional, or sustainable development; (ii) were published in peer-reviewed journals between 2018 and 2024; and (iii) represented empirical, conceptual, or systematic review contributions. A further 310 articles were excluded, leaving 127 for final synthesis.

Inclusion: A final corpus of 127 articles was retained and subjected to full coding and thematic synthesis.

Coding procedures: Each retained article was coded using a structured extraction protocol covering six dimensions: (a) bibliographic metadata (authors, year, journal, country); (b) methodological approach (conceptual/theoretical, qualitative, quantitative, mixed methods, bibliometric); (c) governance dimensions addressed (regulatory, institutional, ethical, algorithmic, data, participatory, multi-level); (d) territorial scale of analysis (local, regional, national, supranational); (e) sustainability dimensions foregrounded (economic, social, environmental, institutional, spatial); and (f) key findings and theoretical contributions. Coding was recorded in a structured matrix using spreadsheet software, with all entries retrievable for verification.

Thematic synthesis: Following coding, a thematic synthesis approach was applied (Thomas & Harden, 2008). Coded findings were first grouped inductively by conceptual similarity, generating an initial set of emergent themes. These were then iteratively refined through

constant comparison across articles. Five major analytical themes were identified: (1) institutional quality as governance precondition; (2) multi-actor coordination as governance architecture; (3) data governance as structural infrastructure; (4) digital transformation and data-driven territorial governance; and (5) methodological diversification. These themes are directly linked to the conceptual framework in Section 6.

Article classification criteria: Articles were classified by: (i) methodological approach; (ii) research method; (iii) geographical focus (by country and continent); and (iv) publication journal. This classification underpins the systematic mapping in Section 4.

Coding reliability: As coding was conducted primarily by the first author, reliability was ensured through a multi-step verification process. The second author independently cross-checked a random sample of 20% of coded articles ($n = 25$) across all coding dimensions. Discrepancies were resolved through structured team discussion. All thematic groupings were verified against the raw data in a second coding pass before the final synthesis. This procedure aligns with recommended practices for single-coder SLR reliability (Tranfield et al., 2003; Page et al., 2021).

The complete PRISMA flow is presented in Figure 1.

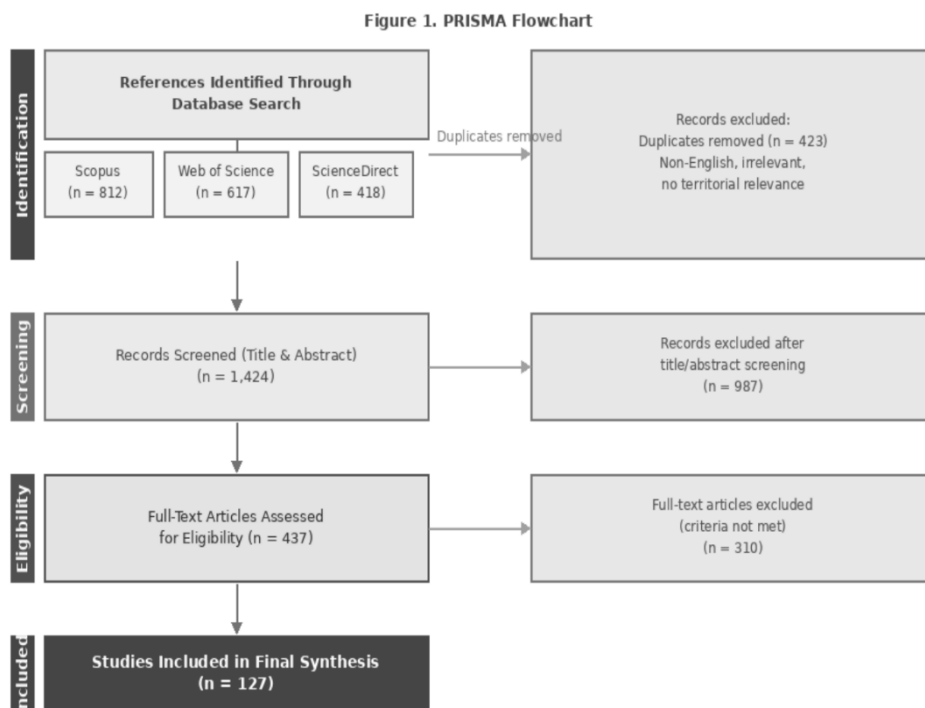


Figure 1. PRISMA Flowchart. Source: Authors.

4 RESULTS

4.1 YEAR-WISE PUBLICATION TRENDS

Publication output grew steadily over the 2018–2024 period, reflecting increasing academic interest in AI governance within the framework of sustainable territorial development. The years 2018 and 2019 (7 and 11 articles, respectively) represent an early exploratory phase when conceptual frameworks were being established. The inflection point at 2020 reflects converging catalysts: the COVID-19 pandemic accelerated digital governance adoption, while the EU White Paper on AI and the OECD AI Principles stimulated scholarly attention. Output rose to a peak of 28 articles in 2023 four times the 2018 volume driven by the introduction of the EU AI Act and the UN Secretary-General's report on global AI governance. The slight deceleration in 2024 (23 articles) reflects consolidation dynamics typical of emerging interdisciplinary fields, not declining interest.

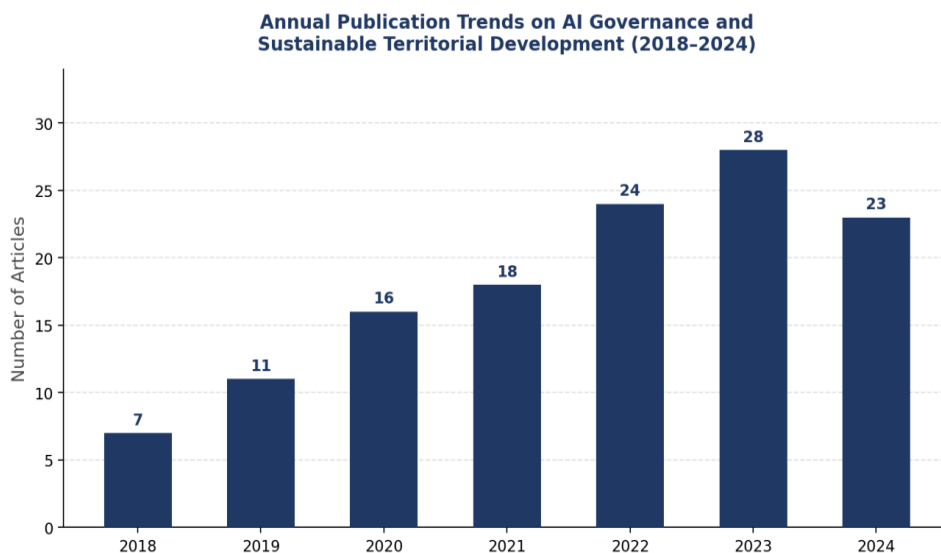


Figure 2. Annual Publication Trends on AI Governance and Sustainable Territorial Development (2018–2024). Source: Authors.

4.2 GEOGRAPHICAL DISTRIBUTION OF RESEARCH CONTRIBUTIONS

China leads the corpus with 28 articles, followed by the United States (22) and the United Kingdom (16). Germany (10) and Australia (8) rank next, with France, the Netherlands, Canada, Italy, and Spain each contributing 6–8 articles. Global South countries including Morocco, Sub-Saharan Africa, South and Southeast Asia, and Latin America are severely under-represented, signalling that the literature reflects governance realities in high-capacity institutional environments and may have limited external validity for territories with greater AI

governance deficits. Future research should explicitly target under-represented regional settings.

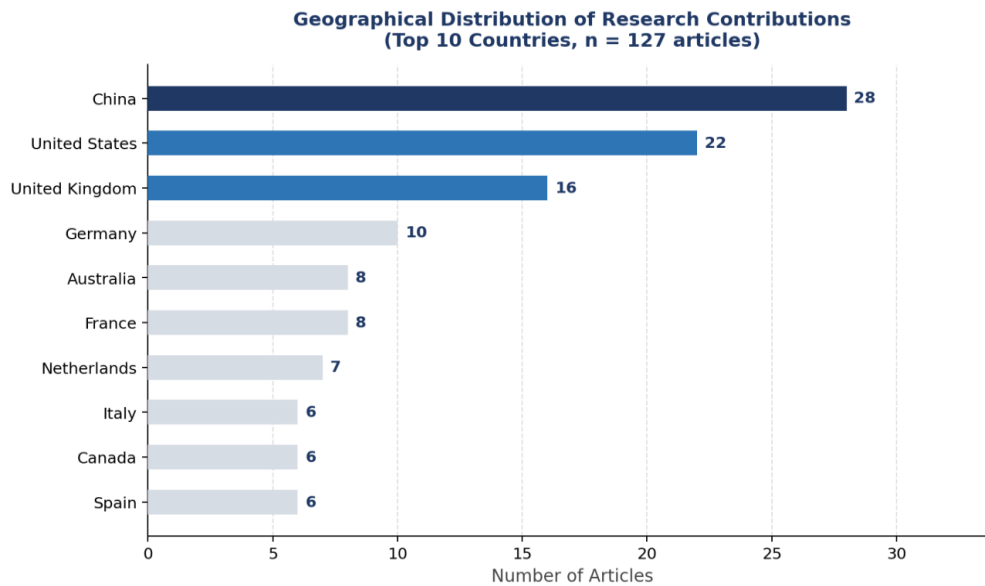


Figure 3. Geographical Distribution of Research Contributions (Top 10 Countries). Source: Authors.

4.3 DISTRIBUTION BY CONTINENT

Europe dominates the sample, accounting for approximately 41% of all retained articles (52/127). This reflects the EU's institutional leadership in AI regulation, exemplified by the EU AI Act. Asia follows with 30% (38 articles), led by China. The Americas account for 17% (22 articles), while Oceania (8) and Africa and others (7) together represent 12%. The systematic under-representation of Latin America reflects structural inequalities in research capacity and digital infrastructure that simultaneously constrain these regions' contribution to the global AI governance debate and their ability to develop locally adapted governance responses.

Distribution of Research Contributions by Continent

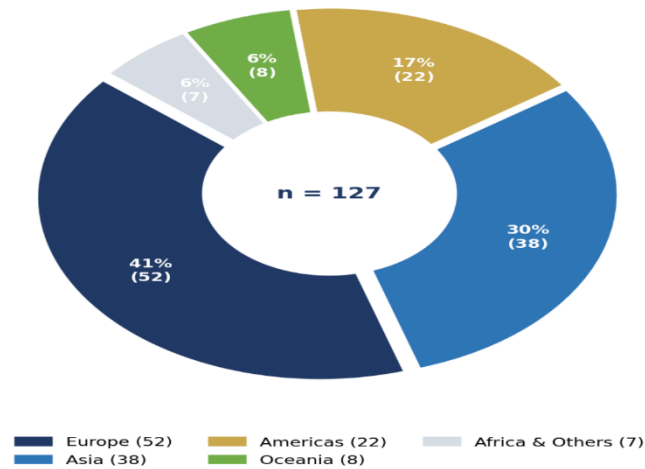


Figure 4. Distribution of Research Contributions by Continent. Source: Authors.

4.4 DISTRIBUTION BY ADOPTED METHODOLOGICAL APPROACH

Conceptual and theoretical approaches constitute the largest category, representing approximately 38% of reviewed studies. This dominance reflects the field's current stage of development: researchers are establishing common analytical vocabularies before systematic empirical testing. Qualitative approaches account for 28%, encompassing case studies, policy discourse analyses, expert interviews, and ethnographic research. Quantitative contributions represent approximately 19%. Mixed-methods and bibliometric studies account for 10% and 5%, respectively. This distribution points to a critical methodological frontier: the field urgently needs triangulated, mixed-methods designs capable of generating causal evidence on the territorial effects of AI governance interventions.

Distribution by Adopted Methodological Approach (%)

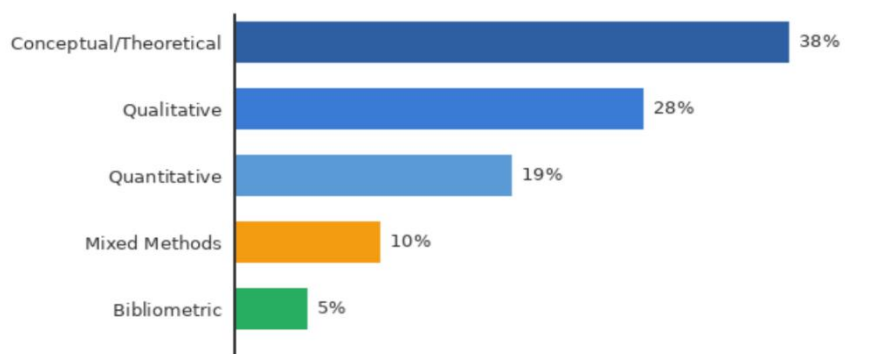


Figure 5. Distribution of Reviewed Articles by Methodological Approach. Source: Authors.

4.5 DISTRIBUTION BY PUBLICATION JOURNALS

The 127 articles are distributed across a diverse cluster of interdisciplinary journals. Sustainability (MDPI) leads with 30 articles, reflecting its explicit SDG orientation. Government Information Quarterly (18 articles) anchors the governance and public administration literature. AI and Society (17), AI and Ethics (15), and Technological Forecasting and Social Change (13) address societal and ethical dimensions. The presence of Regional Studies (11) and Urban Studies (10) signals a growing territorial and spatial turn within AI governance scholarship a trend this review documents and seeks to extend. Land Use Policy (8) and Environmental Research Letters (5) represent the environmental sustainability dimension. The multi-journal distribution confirms the inherently interdisciplinary character of this research area, spanning public administration, regional science, AI ethics, environmental management, and urban studies.

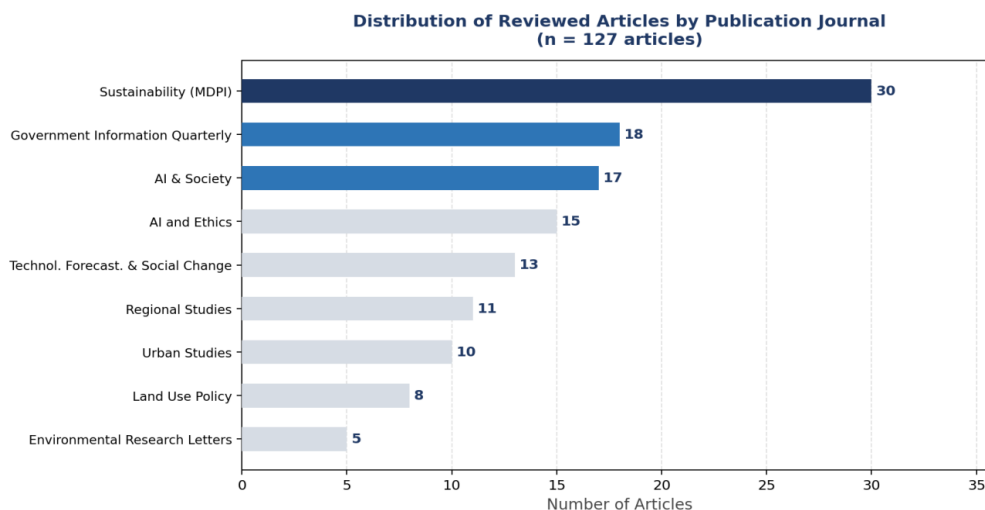


Figure 6. Distribution of Reviewed Articles by Publication Journal. Source: Authors.

4.6 DISTRIBUTION OF RESEARCH METHODS

Policy analysis and literature review methods jointly account for approximately 40% of studies, reflecting the current emphasis on regulatory frameworks and knowledge synthesis. Case study methods represent about 19%. Framework-building works (14%), comparative studies (10%), econometric and spatial statistical analyses (8%), expert interview studies (5%), and bibliometric analyses (4%) complete the distribution. The near-absence of experimental and quasi-experimental designs is a significant methodological gap, limiting the field's capacity to generate causal evidence on the effectiveness of specific governance interventions.

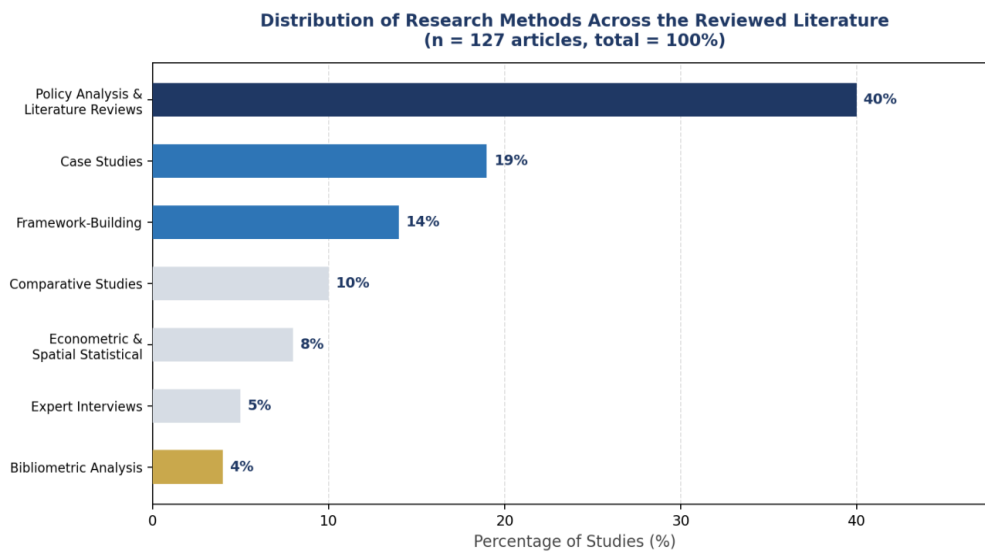


Figure 7. Distribution of Research Methods Across the Reviewed Literature. Source: Authors.

4.7 LEXICAL ANALYSIS OF KEYWORDS

A keyword co-occurrence analysis was conducted using keywords from the 127 retained articles. The map reveals a conceptual architecture structured around three thematic clusters. The first groups 'AI Governance' with Ethics, Transparency, Accountability, Responsible AI, and Data Governance. A second cluster links 'Sustainability,' SDGs, and Environmental Management. A third combines 'Territorial Development,' 'Smart Cities,' 'Regional Policy,' 'Digital Transformation,' and 'Innovation.' Bridging concepts Inclusion, Resilience, and Public Policy occupy the interstices between clusters, underscoring their integrative theoretical function. Notably, Algorithmic Bias and Digital Divide remain comparatively peripheral despite their direct territorial relevance, indicating that these equity-critical constructs are not yet fully integrated into the field's conceptual apparatus a gap that future theoretical work must address.

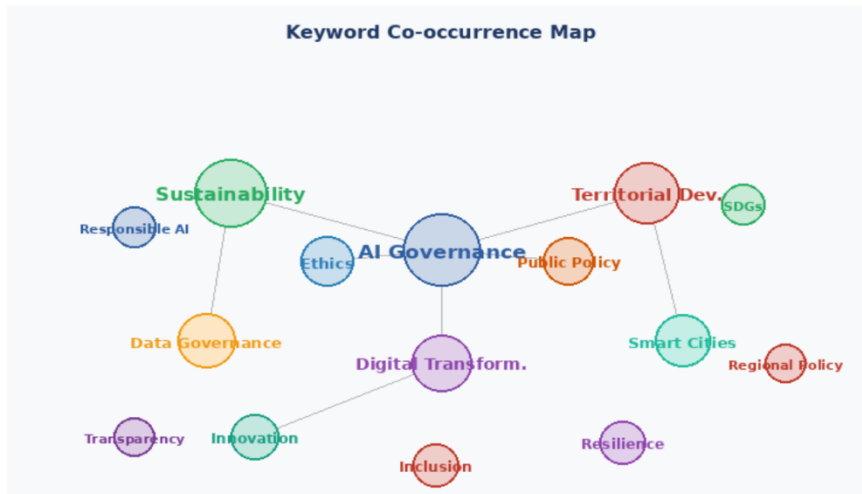


Figure 8. Keyword Co-occurrence Map: AI Governance and Territorial Sustainability Literature (2018–2024). Source: Authors.

5 DISCUSSION

The synthesis of 127 articles reviewed under the PRISMA protocol (2018–2024) reveals that AI governance is a multi-scalar institutional challenge whose effects on sustainable territorial development are neither automatic nor uniform. They are mediated by local institutional capacity, multi-actor coordination structures, and data governance infrastructure, and are moderated by territorial innovation capacity. This finding challenges technocentric narratives and positions governance architecture as the decisive variable.

The first analytical pattern concerns the constitutive role of institutional quality. Identical regulatory instruments produce markedly different governance and sustainability outcomes depending on institutional context (Rodríguez-Pose, 2020; Cicerone et al., 2024). In high-capacity settings, transparency demands generate substantive accountability; in low-capacity settings, they produce compliance performance without meaningful change. This has critical implications for the global transferability of AI governance frameworks: the EU AI Act cannot be expected to deliver equivalent results in institutionally weaker territories without accompanying capacity-building investments (European Committee of the Regions, 2024).

The second pattern is the centrality of multi-actor coordination as the organisational architecture through which governance commitments are translated into territorial practice. Polycentric governance models combining national ministries, regional agencies, local authorities, technology firms, research bodies, and civil society are better equipped to handle the complexity and context-specificity of territorial AI applications than single-authority

frameworks (Moe & Størksen, 2022). Portugal's National Strategy for Smart Territories, which deliberately constructs multi-actor coordination infrastructure around AI, IoT, and 5G deployment at the municipal level, is cited as a leading model (OECD, 2025).

The third pattern is data governance as structural territorial infrastructure. 'Data desert' regions lacking digital infrastructure or administrative capacity to produce the data streams required to train and calibrate AI face systematic structural disadvantage, creating dynamics in which AI implementation amplifies rather than mitigates spatial inequality (Sadowski, 2019; Coll Berini et al., 2025). Without explicit governance interventions to build shared data infrastructures and ensure data interoperability, AI deployment systematically recreates existing information asymmetries.

The fourth pattern traces the emergence of data-driven approaches to territorial governance AI analytics increasingly informing territorial investment priorities and evidence-based sustainable planning (Năstasă & Dumitra, 2024; OECD, 2025). However, qualitative evidence shows that technology-based interventions can reproduce exclusions when governance structures fail to account for the socio-spatial dimensions of algorithmic decision-making (Roberts et al., 2024; Moon, 2023). Data-driven tools must be embedded within participatory and equity-oriented institutional frameworks, not treated as substitutes for them.

The fifth pattern concerns methodological diversification. Conceptual theorisation is increasingly complemented by network analysis, spatial econometrics, and big-data approaches, generating more nuanced evidence on the territorial dimensions of AI governance (Cicerone et al., 2024). The growing adoption of spatial methods reflects recognition that AI governance produces cross-boundary spillovers requiring distributional impact assessment.

Limitations remain. The dominance of European and East Asian case material limits generalisability. The under-representation of quantitative, longitudinal, and experimental designs means that causal mechanisms remain poorly understood. Future research should prioritise comparative and longitudinal studies incorporating governance mechanisms, spatial spillovers, and inclusion outcomes across diverse territorial settings—particularly the Global South, post-conflict territories, and remote areas with distinct data sovereignty challenges (Moe & Størksen, 2022; Năstasă & Dumitra, 2024).

Taken together, the evidence supports a coherent interpretive conclusion: AI governance and sustainable territorial development are mutually reinforcing when governance is genuinely multi-level, institutionally embedded in local networks, and attentive to data infrastructure and structural territorial dependencies. The key theoretical contribution is to frame AI governance

as an ecosystem property produced by the interplay of institutions, data infrastructures, multi-actor coordination, and responsible deployment practices rather than as a technical or regulatory phenomenon in isolation (Camilleri, 2024; Roberts et al., 2024).

Table 1: Summary of Recent Studies on AI Governance as a Driver of Sustainable Territorial Development

Authors	Year	Main Findings
Vinuesa et al.	2020	AI can accelerate progress toward all 17 SDGs but may also impede 59 targets through poorly governed deployment; governance is essential for beneficial AI.
Sadowski	2019	Datafication of territory concentrates economic and political power; data governance is foundational to equitable and sustainable AI deployment in territorial contexts.
Moe & Størksen	2022	Systematic review of 28 AI governance articles identifies WHO, WHAT, WHEN, and HOW as key accountability dimensions requiring distinct frameworks across the AI life-cycle.
Năstasă & Dumitra	2024	Publications on AI and sustainable development grew ~21% annually 2020–2023; China, India, and USA lead contributions; COVID-19 acted as a research catalyst.
Roberts et al.	2024	Global AI governance faces structural barriers including regulatory fragmentation, geopolitical divergence, and power asymmetries between states and technology corporations.
Camilleri	2024	75% of AI governance scholarship uses secondary or theoretical methods; primary empirical research remains scarce.
Coll Berini et al.	2025	AI can support sustainable territorial development in fragile contexts such as North Lebanon, but governance deficits and data deserts severely constrain its potential.
OECD	2025	24 of 27 EU member states have national AI strategies; Portugal's Smart Territories Strategy links AI governance to municipal sustainability through multi-actor coordination.

Authors	Year	Main Findings
European Committee of the Regions	2024	Regional and local authorities are key AI deployers yet least resourced in multi-level governance; risk of an AI governance gap between advanced and lagging regions is critical.
Rodríguez-Pose	2020	Institutional quality is the most powerful determinant of regional economic performance and conditions the effectiveness of all governance instruments.
Moon	2023	Participatory AI governance is essential for social inclusion: AI systems co-designed with communities produce more accurate, equitable, and trusted outcomes.
Cicerone et al.	2024	EU AI investment is positively associated with Smart Specialisation priority regions; governance quality mediates the effectiveness of AI-related regional investment.
Díaz-Rodríguez et al.	2023	Operationalising trustworthy AI requires connecting principles, ethics, and accountability to responsible AI systems through structured governance mechanisms.
Bender et al.	2021	Training large AI models generates emissions equivalent to multiple cars' lifetimes; environmental governance of AI infrastructure is a pressing and underregulated challenge.
Wu et al.	2022	Sustainable AI deployment requires energy-efficient infrastructure, renewable energy sourcing, and hardware longevity standards embedded in governance frameworks.
UNESCO	2021	The Recommendation on the Ethics of AI establishes 11 core values and 10 policy action areas for 194 member states.
United Nations CEB	2024	UN system-wide framework for AI governance prioritises human rights, data sovereignty, SDG alignment, and equity.
Kulkov	2024	AI-driven sustainable development requires complementary organisational, technical, and governance capacities; technical AI alone is insufficient.

Authors	Year	Main Findings
Pike et al.	2017	Sustainable territorial development requires integration of economic, social, environmental, and institutional dimensions; place-based strategies outperform generic models.
Tranfield et al.	2003	Systematic review methodology provides a rigorous, transparent, and reproducible protocol for synthesising evidence in management and social science research.

Source: Authors.

6 PROPOSED CONCEPTUAL FRAMEWORK

Drawing on the systematic synthesis, this paper proposes an original conceptual framework for governing AI in the service of sustainable territorial development. The framework identifies the causal pathways, mediating mechanisms, and moderating conditions through which AI governance shapes territorial sustainability outcomes, and advances six testable propositions.

Figure 9 presents the conceptual framework synthesised from the systematic review.

Institutional Quality constitutes the overarching enabling antecedent (Arrow 1): it determines the extent to which AI Governance Mechanisms the core independent variable scan function as intended. AI Governance Mechanisms operate through two parallel mediation pathways. The first runs through Stakeholder Coordination (Arrows 2 and 4), which translates governance intentions into inclusive, multi-actor AI deployment decisions. The second runs through Data Governance Infrastructure (Arrow 5), which ensures governance frameworks are supported by accessible, interoperable, and sovereignty-protected territorial data. Both mediation pathways converge in Responsible AI Practices (Arrow 6), which directly determine Sustainable Territorial Development Outcomes. Territorial Innovation Capacity acts as a moderator of this final causal link (Arrow 7), amplifying sustainability returns in high-capacity territories and attenuating them in low-capacity ones implying a risk of compounding territorial AI divides in the absence of targeted cohesion interventions.

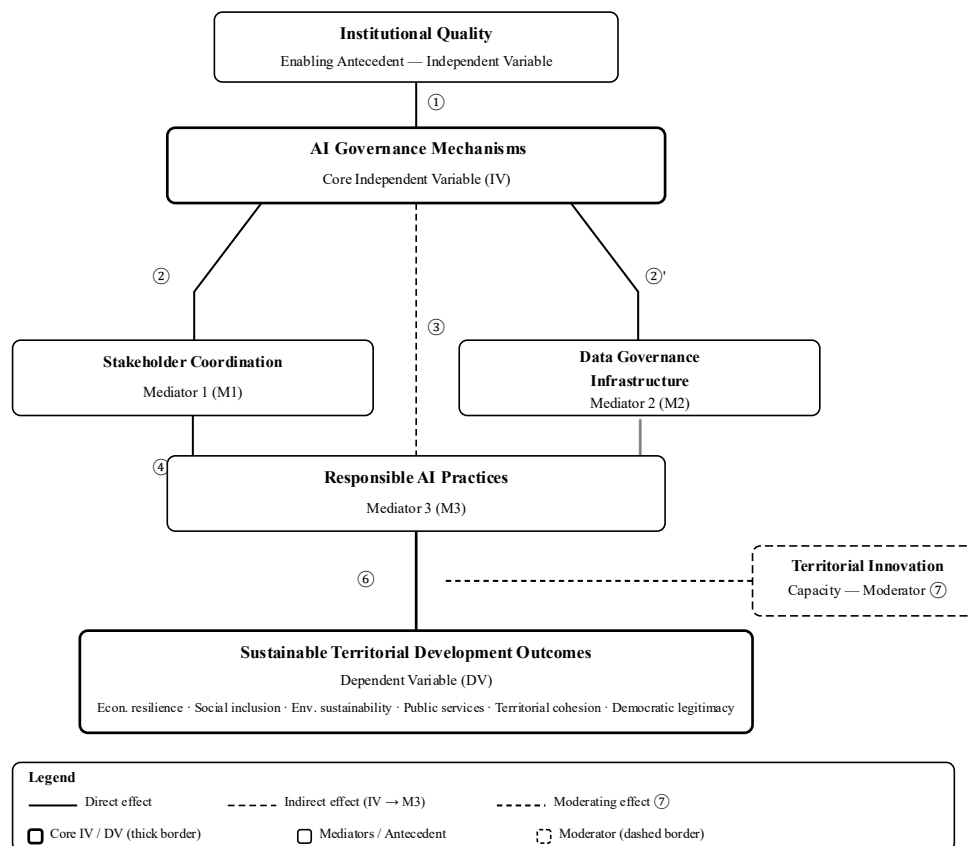


Figure 9. Conceptual Framework: AI Governance Mechanisms and Sustainable Territorial Development Outcomes. Source: Authors.

The framework places Institutional Quality as the enabling condition within which all AI governance processes operate. AI Governance Mechanisms are the primary causal driver. Stakeholder Coordination and Data Governance Infrastructure function as parallel mediating pathways, translating governance intentions into practice. Responsible AI Practices integrate both mediation pathways into the direct antecedent of sustainable outcomes. Territorial Innovation Capacity moderates the strength of this final link, conditioning the extent to which responsible AI translates into equitable sustainable development across diverse spatial contexts (Adile et al).

Testable Propositions

P1: Institutional quality positively conditions the effectiveness of AI governance mechanisms; identical regulatory instruments yield greater accountability and equity in high-capacity institutional settings than in low-capacity settings.

P2: Well-designed AI governance mechanisms combining transparency, accountability, ethical controls, and participatory practices facilitate stakeholder coordination, mitigating information asymmetries and aligning AI deployment with territorial development goals.

P3: Data governance infrastructure quality moderates the relationship between AI governance mechanisms and sustainable territorial outcomes: mechanisms failing to address data access, interoperability, and sovereignty generate weaker and more inequitably distributed sustainability benefits.

P4: Responsible AI practices mediate the relationship between AI governance mechanisms and sustainable territorial development outcomes, operationalising governance commitments through fairness, environmental accountability, and community responsibility.

P5: Territorial innovation capacity moderates the relationship between responsible AI practices and sustainable development outcomes, creating a risk of growing territorial AI divides in the absence of targeted cohesion interventions.

P6: Multi-level governance structures effectively integrating local, regional, national, and supranational AI oversight generate more territorially inclusive and environmentally sustainable outcomes than governance concentrated at a single administrative level.

7 PRACTICAL IMPLICATIONS

For national governments and supranational regulatory bodies, the findings underscore the need for territorially differentiated AI regulation. Uniform frameworks cannot deliver equitable sustainability results without mechanisms for territorial adaptation. The EU AI Act will not produce equal implementation results without specific capacity-building programmes for small municipalities, peripheral areas, and under-resourced public administrations (European Committee of the Regions, 2024; OECD, 2025).

For regional and local authorities, AI governance is a strategic institutional capability requiring active investment. Regional AI governance departments should develop expertise in algorithmic auditing, data governance, participatory design, and environmental impact assessment. The Galician model combining a regional AI strategy, dedicated AI node, and pioneering regional legislation—offers an instructive example (European Week of Regions and Cities, 2023).

For urban planners, the framework proposes the institutionalisation of territorial AI impact assessment as a standard planning instrument. For public service institutions, the findings emphasise community co-design as a reliability and equity imperative: AI systems designed with target communities consistently outperform those designed without them (Moon, 2023;

UNESCO, 2021). For innovation agencies, the synthesis highlights the need to address AI governance knowledge gaps through governance literacy programmes, not purely technical training. For environmental agencies, the framework explicitly treats the environmental footprint of AI infrastructure as a territorial governance challenge requiring green AI standards (Bender et al., 2021; Wu et al., 2022).

CONCLUSION

This systematic literature review demonstrates that AI governance is a determinant of sustainable territorial development trajectories and inclusive regional futures. The analysis of 127 peer-reviewed articles confirms that AI governance extends well beyond technical regulation: its effects are deeply conditioned by institutional quality, multi-level coordination, responsible deployment practices, and territorial data infrastructure. Sustainable outcomes emerge when governance systems successfully organise public, private, and societal actors around place-specific economic, social, and environmental priorities.

Theoretically, the review advances a systemic view of AI governance as a context-dependent, institutionally embedded process driven by data architectures, actor networks, and responsible AI principles. Empirically, it establishes the significance of multi-level governance, data infrastructure investment, and participatory mechanisms, while highlighting stark spatial disparities in governance capacity that cohesion policies must explicitly address.

The paper's central practical thesis is that governance quality is not a by-product of territorial AI strategy but its foundational pillar. Territories investing in institutional capacity, multi-actor coordination, data infrastructure, and responsible AI practices will be disproportionately positioned to capture AI's transformative potential. Those that do not risk compounding structural disadvantage a dynamic that regional and territorial policy must urgently challenge. Future research should prioritise comparative and longitudinal studies examining AI governance dynamics across diverse territorial settings, with particular attention to the Global South, post-conflict regions, and rural areas with distinct data sovereignty challenges. Experimental designs assessing the causal impacts of governance instruments, and participatory research positioning territorial communities as AI governance agents, would substantially strengthen the analytical foundations of this field.

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