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Administrative Capacity and the Conversion of Urban Climate Plans into Action

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Abstract: ***Cities increasingly adopt climate adaptation plans, but planning does not ensure that proposed actions reach implementation or operation. This article conceptualizes administrative capacity as a policy-conversion capability embedded in municipal oversight and coordination routines. It examines public CDP–ICLEI Track disclosures from 2022–2025, with a primary 2025 sample of 758 local governments, including 615 reporting adaptation actions with codable implementation status. The analysis measures portfolio maturity, the share of actions in implementation, and the share in operation. Models adjust for observable action-reporting selection, country context, population, risk assessment, plan adoption, adaptation goals, and disclosure pathway. In the weighted 2025 models, a one-standard-deviation increase in oversight-process coverage is associated with a 0.191-point increase on the five-stage maturity scale, a 4.4-percentage-point increase in implementation share, and a 5.1-percentage-point increase in operational share. The largest differences occur between cities with low and moderate oversight coverage; additional processes beyond a moderate institutional bundle yield limited observable gains. Country-fixed-effects, fractional-outcome, alternative-measure, and pooled models support the main between-city relationship, although within-city and transition-specific results do not establish a short-run causal effect. Enabling administrative conditions are most consistently associated with operationalization. Reported hazard severity and finance-seeking project progress do not explain the central oversight relationship. The findings show that urban adaptation delivery is associated with durable connections among climate priorities, managerial responsibility, budgeting, interdepartmental coordination, political oversight, risk systems, and performance management. They support an institutional rather than resource-isolation account of urban adaptation implementation while remaining associational rather than causal.***

Keywords: Administrative capacity; Climate adaptation; Policy implementation; Urban governance; Policy coordination; Local government.

1. INTRODUCTION

Cities have become central sites of climate adaptation. Municipal governments assess local risks, prepare climate strategies, revise land-use rules, invest in protective infrastructure, and coordinate public and private actors whose decisions shape urban vulnerability. The spread of these activities has generated a substantial literature on urban climate planning, experimentation, and multilevel governance (Bulkeley & Betsill, 2005; Betsill & Bulkeley, 2006; Castán Broto & Bulkeley, 2013; Gordon, 2018). Yet the proliferation of plans does not establish that cities can implement them. Comparative assessments repeatedly identify weaknesses in implementation arrangements, monitoring, institutional integration, and the translation of stated priorities into concrete interventions (Baker et al., 2012; Araos et al., 2016; Reckien et al., 2018; Aboagye & Sharifi, 2024).

This distinction between planning and delivery is particularly important for climate adaptation. Adaptation is not a single policy instrument or capital project. It comprises regulatory changes, public services, infrastructure, ecosystem management, risk information, emergency preparedness, and organizational reforms distributed across municipal departments and levels of government. A city may recognize climate risk and adopt a formal plan while lacking the authority, routines, resources, or coordination needed to move proposed actions through feasibility, implementation, completion, and operation. The resulting implementation gap is therefore better understood as a sequence of conversion problems than as a simple contrast between having and not having a plan.

Existing urban-adaptation research provides strong accounts of the barriers to this conversion. Studies identify fragmented mandates, limited budgets and staffing, weak information, short political horizons, organizational silos, and insufficient coordination across levels of government (Measham et al., 2011; Pasquini et al., 2013; Hamin et al., 2014; Leiren & Jacobsen, 2018; Clar, 2019). Mainstreaming research similarly shows that inserting adaptation into policy documents differs from embedding it in budgeting, risk management, sectoral planning, performance systems, and routine administrative decisions (Uittenbroek et al., 2013; Uittenbroek, 2016; Runhaar et al., 2018; Skagen & Boasson, 2024). Much of this evidence, however, comes from individual countries, selected pioneer cities, interviews, or assessments of plan content. It rarely connects comparable organizational arrangements to downstream implementation status across a large global sample.

Public-administration scholarship offers a useful way to address this gap. Policy capacity is not simply a stock of personnel or technical knowledge. It is the set of analytical, operational, and political competences through which organizations formulate, coordinate, and implement collective decisions (Christensen & Gazley, 2008; Wu et al., 2015; Howlett & Ramesh, 2016). Implementation research likewise emphasizes that policy performance depends on organizational structures, routines, and interorganizational relationships after formal adoption (Matland, 1995; O'Toole, 2000; May, 2015). For cross-cutting problems, capacity includes the ability to integrate responsibilities across departments, connect budgets to priorities, assign managerial authority, maintain political oversight, and incorporate goals into risk and performance systems (Christensen & Lægreid, 2007; Candel & Biesbroek, 2016; Trein et al., 2019; Vince et al., 2024).

Building on these insights, this article conceptualizes urban administrative capacity as a policy-conversion capability. The central claim is that cities are better able to move adaptation actions downstream when climate responsibility is institutionalized across a sufficiently broad bundle of oversight and coordination processes. These processes include budgeting, management and committee responsibility, council information, interdepartmental communication, risk-management policies, formal plans, and performance objectives. The argument does not assume that every additional procedure produces an equal benefit. Instead, establishing a minimum bundle may be more consequential than moving from an already moderate level of institutionalization to maximal process coverage.

The article examines this argument using public CDP–ICLEI Track disclosures from 2022–2025. The primary analysis focuses on 758 local governments reporting in 2025, including 615 with at least one adaptation action whose implementation status can be coded. Rather than measure only plan adoption or the presence of an action, the analysis constructs three portfolio outcomes: mean implementation maturity on a five-stage scale, the share of actions that have entered implementation, and the stricter share that are operational. The models adjust for observable differences in the probability of reporting codable action status and assess robustness to country fixed effects, fractional outcome models, alternative capacity measures, and pooled between- and within-city specifications.

The study makes three contributions. First, it reframes the urban adaptation implementation gap as a policy-stage conversion problem. This moves comparative analysis beyond plan counts and stated commitments toward the maturity and operation of reported action portfolios. Second, it connects urban climate governance to public-administration research on implementation capacity, coordination, and policy integration. The study measures whether climate responsibility is embedded in an institutional bundle rather than treating staff, finance, or knowledge as isolated barriers. Third, it provides global comparative evidence that can distinguish the main capacity relationship from two plausible alternative explanations: cities facing higher reported climate risk may implement more, and cities with more mature finance-seeking project pipelines may be better positioned to deliver. The results show that neither reported hazard severity nor the external project pipeline accounts for the central oversight relationship.

This focus also differentiates the article from the closest global CDP research. Recent work using the 2023 CDP dataset examines the types, drivers, and co-benefits of adaptation actions reported by 910 cities (Liu et al., 2025). The present study asks a different question: conditional on reporting an adaptation portfolio, which administrative arrangements are associated with moving that portfolio from early-stage development into implementation and operation? This distinction between the adoption of adaptation activity and its downstream administrative conversion is the article's principal empirical and theoretical focus.

The next section develops the conversion-capability framework and two hypotheses. The subsequent sections describe the data and estimation strategy, present the 2025 and pooled results, and discuss what the findings imply for urban climate governance and administrative reform.

2. ADMINISTRATIVE CAPACITY AND POLICY STAGE CONVERSION

2.1 The Urban Adaptation Implementation Gap

Research on urban climate adaptation initially concentrated on whether cities recognized climate risks and produced plans. This focus was warranted because adaptation entered local agendas unevenly and often lagged behind mitigation. Plan assessments documented differences in problem definition, vulnerability analysis, policy

instruments, participation, and monitoring (Baker et al., 2012; Araos et al., 2016; Reckien et al., 2018). More recent global stocktakes have broadened attention from planning to implemented adaptation, but continue to confront inconsistent definitions, selective reporting, and limited evidence on outcomes (Berrang-Ford et al., 2019, 2021).

The presence of a plan is an incomplete indicator because policy adoption and policy implementation involve different organizational demands. Planning can be concentrated in a specialist climate team or supported by external consultants. Implementation normally requires other departments to allocate staff, amend operating procedures, commit budgets, coordinate procurement, use risk information, and maintain an intervention after its launch. An adaptation strategy can therefore be comprehensive on paper while remaining weakly connected to the routines through which municipal organizations allocate authority and resources.

This problem appears across diverse institutional contexts. Research in South Africa identifies limited resources and difficulties mainstreaming adaptation into municipal functions (Pasquini et al., 2013; Chu et al., 2016). Studies of British local governments highlight the importance of usable information, organizational fit, and local authority (Porter et al., 2015). Work in the Netherlands shows that mainstreaming depends on how adaptation enters routine planning processes and can be obstructed by existing organizational practices (Uittenbroek et al., 2013; Uittenbroek, 2016). Evidence from Indonesia, Mauritius, Mexico, Brazil, and Colombia likewise points to capacity, sectoral coordination, and policy translation as recurring implementation problems (Yoseph-Paulus & Hindmarsh, 2018; Williams et al., 2020; Milhorance et al., 2022; Cid & Lerner, 2023).

Barrier research has helped organize these constraints but is less suited to measuring the cumulative movement of policy downstream. Moser and Ekstrom (2010) distinguish barriers arising across understanding, planning, and management. Biesbroek et al. (2013) and Eisenack et al. (2014) caution that barriers are relational, context-dependent, and shaped by the actors diagnosing them. These frameworks explain why implementation may stall, but they do not by themselves provide a comparable city-level outcome.

The present study treats adaptation as a sequence of conditional transitions:

Risk recognition → Planning → Action development → Implementation → Operation

Each transition requires a different combination of authority, information, coordination, and resources. The implementation gap is the cumulative result of actions failing to move through one or more stages. This formulation avoids classifying every announced or planned activity as implemented and recognizes that "implementation underway" is substantively different from an intervention that has become operational.

2.2 Administrative Capacity as Conversion Capability

Policy-capacity scholarship provides the theoretical foundation for explaining differences in conversion. Wu et al. (2015) distinguish analytical, operational, and political capacities at individual, organizational, and system levels. Howlett and Ramesh (2016) argue that governance failures can arise from specific deficits within these capacity dimensions. Christensen and Gazley (2008) similarly emphasize that administrative capacity is multidimensional and must be defined in relation to what an organization is expected to accomplish. Capacity is therefore not an abstract attribute possessed equally for every policy problem. It concerns the competences and arrangements required to perform particular tasks.

Implementation is one such task. Classic implementation scholarship demonstrates that formally authorized policies can be transformed, delayed, or displaced as they move through organizations and implementation networks (Matland, 1995; O'Toole, 2000). Policy regimes with clearer authority, supportive coalitions, and coherent implementation structures are more likely to sustain performance (May, 2015). Recent comparative evidence further shows that policy growth can outpace the administrative systems responsible for delivery, producing implementation burdens that reduce policy performance (Fernández-i-Marín et al., 2024).

For urban adaptation, the relevant task is not merely producing analysis or selecting an instrument. It is combining climate knowledge with budgetary, managerial, political, and sectoral processes so that multiple departments act on it. A city may employ technically skilled climate staff but still lack the organizational reach to influence capital planning, public works, health services, land-use decisions, or emergency management. Conversely, a city may possess general administrative resources that remain disconnected from adaptation priorities. Conversion

capability exists when climate responsibility is embedded in the processes that authorize, coordinate, monitor, and sustain implementation.

This interpretation is consistent with the shift from shallow to embedded policy integration. Policy integration is not achieved by mentioning a cross-cutting objective in multiple documents. It develops through an ongoing process in which objectives, instruments, organizational responsibilities, and evaluation practices become mutually reinforcing (Candel & Biesbroek, 2016; Tosun & Lang, 2017; Skagen & Boasson, 2024). Integrative capacity accordingly includes coordination, accountability, resources, political support, and institutional architecture (Vince et al., 2024). In the adaptation context, these elements determine whether climate priorities remain the responsibility of a specialist unit or enter the operating systems of the wider municipal organization.

2.3 Oversight and Coordination as an Institutional Bundle

Climate adaptation is intrinsically cross-sectoral. Heat, flooding, water scarcity, wildfire, and disease affect responsibilities distributed across planning, infrastructure, health, housing, environmental management, finance, and emergency services. No single department normally controls all the instruments required for implementation. The coordination problem is both horizontal, across municipal departments, and vertical, across local, regional, and national governments (Betsill & Bulkeley, 2006; Adam et al., 2019; Clar, 2019).

Public-administration research suggests that coordination depends on structures and routines rather than goodwill alone. Whole-of-government approaches seek to counter departmental fragmentation by aligning responsibilities, information, and accountability (Christensen & Lægreid, 2007). Network-governance research likewise shows that collective performance depends on how coordination is organized and managed (Provan & Kenis, 2008; Ansell & Gash, 2008; Emerson et al., 2012). These insights have direct relevance for urban climate governance, where municipal networks and administrative organizations can provide information and support but cannot substitute for the internal capacity of member cities (Nguyen Long & Krause, 2021).

The article therefore focuses on eight processes through which climate responsibility can become institutionally embedded: integration into budgets and capital expenditure, assignment to management, assignment to committees, information provided to the council or equivalent political body, interdepartmental information flows, integration into risk management, incorporation into plans and strategies, and inclusion in performance objectives. Individually, each process addresses a particular implementation problem. Collectively, they connect political oversight, administrative responsibility, resource allocation, information exchange, and organizational monitoring.

The emphasis on a bundle is important. An assigned manager without budget integration may lack resources. A formal committee without interdepartmental information may become ceremonial. A plan without performance objectives may not influence ongoing management. Budget provisions without political and managerial oversight may not survive competing priorities. A broader configuration can create complementarities among otherwise partial arrangements.

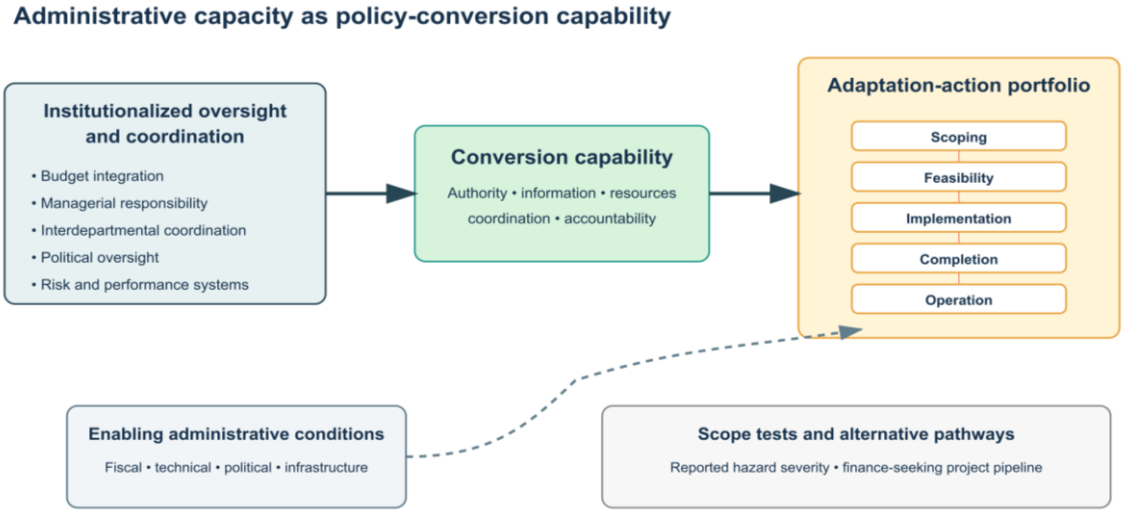

Figure 1: Administrative Capacity as Policy Conversion Capability

Figure 1 summarizes the proposed conversion mechanism, the role of enabling administrative conditions, and the two empirical scope tests.

Note. The framework links institutionalized oversight and coordination to the conversion of adaptation actions from scoping through operation. Enabling administrative conditions support downstream operation; hazard severity and the finance-seeking project pipeline are evaluated as scope tests.

This leads to the first hypothesis:

H1 Institutionalization hypothesis: Cities with broader institutionalized climate oversight and coordination processes report more mature implementation portfolios, higher implementation shares, and higher operational shares.

2.4 A Minimum Institutionalization Threshold

The relationship between oversight breadth and implementation need not be linear. At very low levels of institutionalization, adding a process may fill a fundamental organizational gap. Connecting adaptation to budgeting, management, interdepartmental communication, or risk systems can give climate priorities an administrative route into implementation. Once a workable bundle exists, further processes may overlap with existing arrangements or produce smaller marginal gains.

This expectation follows from the idea that policy integration requires several complementary conditions. Coordination, authority, resourcing, and accountability are not perfect substitutes (Trein et al., 2019; Vince et al., 2024). Below a minimum level, the absence of one or more elements can prevent conversion even when other elements are present. Above that level, organizations may differ in the exact configuration they use without showing proportionate differences in implementation. Network-governance research similarly cautions that more structures do not automatically produce better outcomes; effectiveness depends on fit, management, and the tasks being coordinated (Provan & Kenis, 2008).

The threshold argument also avoids equating administrative complexity with capacity. An index with more reported procedures can reflect genuine institutionalization, but maximal procedural coverage is not inherently desirable. Additional committees, reporting requirements, or performance systems could become duplicative. The theoretically relevant contrast is therefore between weakly embedded climate responsibility and the presence of a sufficiently broad operational bundle.

This leads to the second hypothesis:

H2 Minimum-threshold hypothesis: The largest implementation difference occurs between cities with low and moderate oversight coverage, while the difference between moderate and high coverage is smaller.

2.5 Enabling conditions, climate risk, and project pipelines

Oversight arrangements do not exhaust administrative capacity. Cities also report whether fiscal, technical, institutional, political, participatory, and infrastructure conditions support or constrain adaptation. These conditions may matter most at the strictest downstream stage. Initiating implementation can occur through a pilot, temporary program, or project award, whereas maintaining an operating intervention requires staff, resources, infrastructure, and institutional support. The analysis therefore examines whether a more enabling administrative environment is especially associated with operational share. Because this relationship is less stable in the pooled evidence, it is treated as a secondary stage-specific expectation rather than a central hypothesis.

Two additional explanations are assessed as scope tests. First, cities reporting more severe hazards may face greater pressure to implement. Urban climate governance research has long emphasized that risk, political attention, and local context shape adaptation agendas (Hughes, 2017; Sainz de Murieta et al., 2021). If hazard severity accounts for the capacity relationship, institutionalization may simply identify cities facing stronger climate pressure. The analysis therefore tests both the direct role of self-reported hazard severity and its interaction with capacity.

Second, administrative capacity may operate through project preparation and access to finance. Climate-finance

research shows that global initiatives privilege projects and cities judged close to bankability and that project-preparation facilities shape which interventions enter investment pipelines (Grafe et al., 2025). Yet finance-seeking projects represent only part of urban adaptation. Regulatory changes, services, organizational reforms, and internally funded activities may not appear in an external-finance pipeline. The empirical analysis therefore asks whether capacity predicts project maturity and partial financing and whether project progress attenuates the capacity coefficient. This test distinguishes an internal administrative-conversion mechanism from an external project-readiness pathway without assuming that either applies to the entire adaptation portfolio.

3. DATA AND METHODS

3.1 Data and Analytical Sample

The analysis uses public CDP–ICLEI Track disclosures from 2022 through 2025. These data contain standardized information on urban climate-risk assessment, planning, governance arrangements, adaptive-capacity conditions, adaptation actions, and projects seeking finance. The four waves contain 3,624 jurisdiction-year observations from 1,525 distinct reporting jurisdictions. Because a single geographic point and a common administrative-capacity concept are less appropriate for provinces, counties, regional bodies, and other large-area authorities, the main sample is restricted to cities, municipalities, towns, and comparable local governments.

The primary analysis uses the 2025 wave, which provides the most recent and internally consistent measurement. The 2025 local-government sample contains 758 respondents. Of these, 615 report at least one adaptation action with a codable implementation status. Non-reporting is treated as missing rather than as evidence that a city has no adaptation action. This distinction is important because cities with codable action data are larger and more likely to report a risk assessment, climate plan, and adaptation goal than cities without codable action status.

The pooled robustness sample covers 2022–2025. It is used to distinguish persistent differences between cities from annual deviations within the same city. Because action portfolios and questionnaire wording can change across disclosure cycles, the pooled analysis is treated as a robustness exercise rather than as a source of causal longitudinal identification.

3.2 Implementation Outcomes

The unit of analysis is the city-year. Action-level status is coded on a five-stage scale: scoping or pre-feasibility (0), feasibility finalized (1), implementation underway (2), implementation complete (3), and action in operation (4). Three city-level outcomes are constructed.

First, implementation maturity is the mean status of all reported actions with a codable status. Second, implementation share is the proportion of reported actions that are underway, complete, or operational. Third, operational share is the proportion that have reached the strictest category, action in operation. The operational outcome distinguishes the start of implementation from the conversion of an intervention into an operating policy, service, or asset.

The outcomes describe the portfolio of actions disclosed by each city, not an inventory of every adaptation activity within the jurisdiction. Changes can therefore reflect both implementation progress and changes in the composition of actions selected for disclosure.

3.3 Administrative Capacity Measures

The primary capacity measure is the breadth of institutionalized climate oversight. CDP asks cities whether climate issues are incorporated into eight processes: budgeting or major capital expenditure, management-level responsibility, committee responsibility, information provided to the council or equivalent body, interdepartmental information flows, risk-management policies, plans and strategies, and performance objectives. The oversight index counts the processes reported by each city and ranges from zero to eight.

The count captures the organizational embedding of climate responsibility rather than the nominal existence of a single climate office. The main models use a standardized continuous measure. Categorical models distinguish low coverage (zero to two processes), moderate coverage (three to five), and high coverage (six to eight). Leave-one-item-out models test whether the index is driven by any single process.

A secondary measure captures whether reported fiscal, technical, institutional, political, participatory, and infrastructure conditions support or constrain adaptation. CDP records each condition on an ordered scale from significantly constraining to significantly supporting. The city-level administrative-factor balance is the mean of non-contextual factors. Alternative specifications use the median balance, the share of supportive factors, a net-support measure, and the reverse of the share of severe constraints.

3.4 Controls and Disclosure Selection

The main models control for log population, completion of a climate-risk and vulnerability assessment, adoption of a climate plan, presence of an adaptation goal, CDP reporting region, and disclosure pathway. Standard errors are clustered by country to allow arbitrary dependence among cities operating within the same national policy environment.

Reporting a codable action portfolio is not random. A logistic selection model estimates each city's probability of having codable action status using population, risk assessment, plan adoption, adaptation goal, region, and disclosure pathway. The primary weighted specifications use stabilized inverse-probability weights among action reporters, trimmed at the first and 99th percentiles. Weighted and unweighted estimates are reported together. These weights adjust only for observed differences among CDP respondents; they do not make the reporting sample representative of all cities.

3.5 Estimation

The principal 2025 models regress each implementation outcome on administrative capacity and the controls. Linear models are used for direct interpretation in outcome units. Fractional-logit models provide a functional-form check for implementation share and operational share. Additional models replace regional controls with country fixed effects, making the comparison primarily among cities within the same country.

The categorical oversight models test for a threshold relationship. A direct contrast between the moderate- and high-coverage groups assesses whether adding processes beyond a moderate institutional bundle produces further gains. The eight oversight components are also estimated separately, with Holm adjustment for multiple testing. These component models are exploratory because the processes are correlated and cities select institutional arrangements jointly.

The pooled models use a Mundlak decomposition. For each capacity measure, the multi-year city mean represents the between-city component, while the deviation from the city mean represents the within-city component. Models include country and year fixed effects and use country-clustered standard errors. Baseline-adjusted lagged models additionally use capacity in year t to predict implementation in year t+1 while controlling for the outcome in year t. These models establish temporal ordering but cannot remove confounding by stable unobserved city characteristics.

3.6 Auxiliary Analyses

Two auxiliary analyses test the scope of the central argument. First, self-reported current hazard severity is calculated as the product of hazard probability and impact magnitude and averaged across each city's reported hazards. Interactions assess whether the capacity relationship is stronger under higher reported risk. The number of hazards reported is included as a disclosure-depth control.

Second, the project module is used to assess whether finance-seeking project readiness transmits the capacity relationship. Project outcomes include average development stage, the share at project structuring or later, the share at implementation or post-implementation, and the share reported as partially funded. A separate selection model adjusts for whether a city reports a codable finance-seeking project. Sequential models compare the capacity coefficient before and after the inclusion of project implementation progress. This is a scope and mechanism-consistency test, not causal mediation analysis.

4. RESULTS

4.1 Conversion from Planning to Implementation

Table 1 reports descriptive statistics for the 2025 sample, and Figure 2 visualizes the principal governance-to-implementation transitions. Formal climate governance is common among respondents. In the main local-government sample, 84.7% report a completed climate-risk assessment. Among cities with a completed assessment, 91.8% report an adopted climate plan. Among plan adopters, 86.7% report at least one action with codable status. The last transition is partly a disclosure transition and should not be read as the absence of action among non-reporters.

Table 1: Descriptive Statistics for the 2025 Local Government Sample

Variable	N	Mean	SD	Min	Max
Implementation maturity (0–4)	615	2.439	1.109	0.000	4.000
Implementation share	615	0.749	0.337	0.000	1.000
Operational share	615	0.366	0.363	0.000	1.000
Oversight-process count (0–8)	589	4.350	2.496	0.000	8.000
Administrative-factor balance	636	-0.640	1.895	-3.000	3.000
Climate-risk assessment	754	0.847	0.360	0.000	1.000
Climate plan	753	0.841	0.366	0.000	1.000
Adaptation goal	753	0.847	0.360	0.000	1.000
Log population	750	12.268	1.735	3.178	17.018
Substantive actions reported	615	7.520	8.584	1.000	87.000
Finance-seeking project maturity	584	2.640	1.610	0.000	6.000

Note. Outcome statistics are calculated for cities reporting codable adaptation-action status; other variables retain all available observations. Binary variables are reported as proportions.

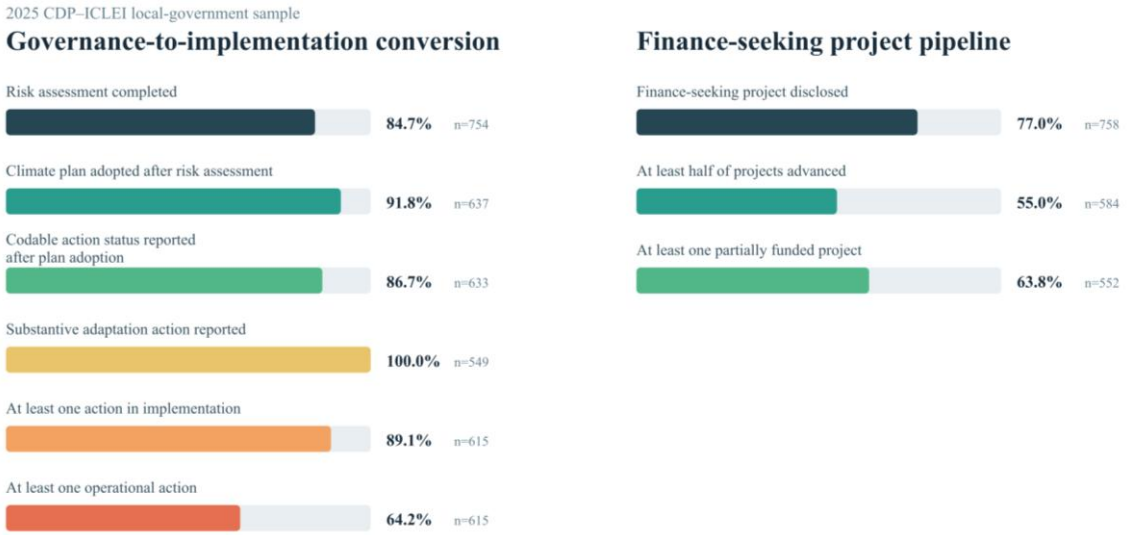

Figure 2: Governance to Implementation Conversion in the 2025 Sample

Note. Rates are conditional on the eligible sample shown for each transition. Reporting codable action status is a disclosure transition and is not equivalent to the absence of action among non-reporters.

Among cities reporting substantive actions, 89.1% have at least one action underway, complete, or operational, while 64.2% report at least one operational action. The difference indicates that the principal downstream bottleneck is not necessarily the initiation of implementation but the conversion of a broader action portfolio into operating interventions.

The finance-seeking project pipeline is less mature. Across 2,420 codable projects in 2025, 53.1% have reached project structuring or a later stage and 33.6% have reached implementation or post-implementation. Among projects with funding status, 44.4% are partially funded.

4.2 Institutionalized Oversight and Implementation

Table 2 presents the principal 2025 estimates. The models show a consistent positive association between oversight-process coverage and all three implementation outcomes. In the selection-weighted regional-control specification, a one-standard-deviation increase in oversight coverage is associated with a 0.191-point increase in

implementation maturity on the zero-to-four scale, a 4.4-percentage-point increase in implementation share, and a 5.1-percentage-point increase in operational share.

Table 2: Administrative Capacity and Adaptation Implementation Outcomes

Outcome	Predictor	Estimate (SE)	N	Countries
Implementation maturity	Oversight coverage	0.191*** (0.048)	524	63
Implementation maturity	Administrative conditions	0.081† (0.047)	543	64
Implementation maturity	Oversight coverage, joint model	0.145** (0.048)	465	61
Implementation maturity	Administrative conditions, joint model	0.068 (0.056)	465	61
Implementation share	Oversight coverage	4.441** (1.568)	524	63
Implementation share	Administrative conditions	1.458 (1.482)	543	64
Implementation share	Oversight coverage, joint model	2.469† (1.446)	465	61
Implementation share	Administrative conditions, joint model	1.330 (1.589)	465	61
Operational share	Oversight coverage	5.063** (1.625)	524	63
Operational share	Administrative conditions	3.929* (1.580)	543	64
Operational share	Oversight coverage, joint model	4.141* (1.640)	465	61
Operational share	Administrative conditions, joint model	3.593* (1.831)	465	61

Note. Entries are coefficients with country-clustered standard errors in parentheses. Share outcomes are expressed in percentage points. Models use trimmed stabilized inverse-probability weights and adjust for log population, risk assessment, climate-plan adoption, adaptation goal, reporting region, and disclosure pathway. † p < .10; * p < .05; ** p < .01; *** p < .001.

The results do not depend on the disclosure-selection adjustment. Weighted estimates are slightly larger than unweighted estimates. They also survive the replacement of regional controls with country fixed effects. In the weighted country-fixed-effects models, a one-standard-deviation increase in oversight coverage is associated with 0.164 higher implementation maturity, 4.2 percentage points higher implementation share, and 4.1 percentage points higher operational share.

Fractional-logit estimates for the bounded outcomes produce nearly the same substantive results. The weighted average marginal association is 3.9 percentage points for implementation share and 4.7 percentage points for operational share. The similarity across linear and fractional specifications indicates that the main result is not driven by the functional form of the linear probability-style models.

4.3 Threshold Relationship

Table 3 reports the threshold contrasts and alternative estimators, while Figure 3 shows the unadjusted outcome means by oversight group. The categorical models indicate that institutional breadth has a threshold form. Relative to cities reporting zero to two oversight processes, cities reporting three to five processes have 0.389 higher implementation maturity and a 13.9-percentage-point higher operational share in the weighted models. Cities reporting six to eight processes also outperform the low-coverage group.

Table 3: Threshold Tests and Alternative Estimators

Outcome	Specification	Estimate (SE)	N
Implementation maturity	Moderate vs. low	0.389** (0.137)	524
Implementation maturity	High vs. low	0.471*** (0.132)	524
Implementation maturity	High vs. moderate	0.108 (0.082)	379
Implementation maturity	Country fixed effects	0.164** (0.051)	501
Implementation share	Moderate vs. low	5.628 (3.900)	524
Implementation share	High vs. low	9.507* (4.266)	524
Implementation share	High vs. moderate	4.933† (2.824)	379
Implementation share	Country fixed effects	4.163* (1.703)	501
Implementation share	Fractional-logit AME	3.934*	524
Operational share	Moderate vs. low	13.905*** (3.834)	524
Operational share	High vs. low	14.313*** (4.128)	524
Operational share	High vs. moderate	0.962 (2.844)	379
Operational share	Country fixed effects	4.141* (1.788)	501
Operational share	Fractional-logit AME	4.662**	524

Note. Threshold estimates use low oversight coverage as the reference unless otherwise stated. Share outcomes and average marginal effects are expressed in percentage points. Fractional-logit average marginal effects are shown without standard errors, with significance based on the underlying logit coefficient. † p < .10; * p < .05; ** p < .01; *** p < .001.

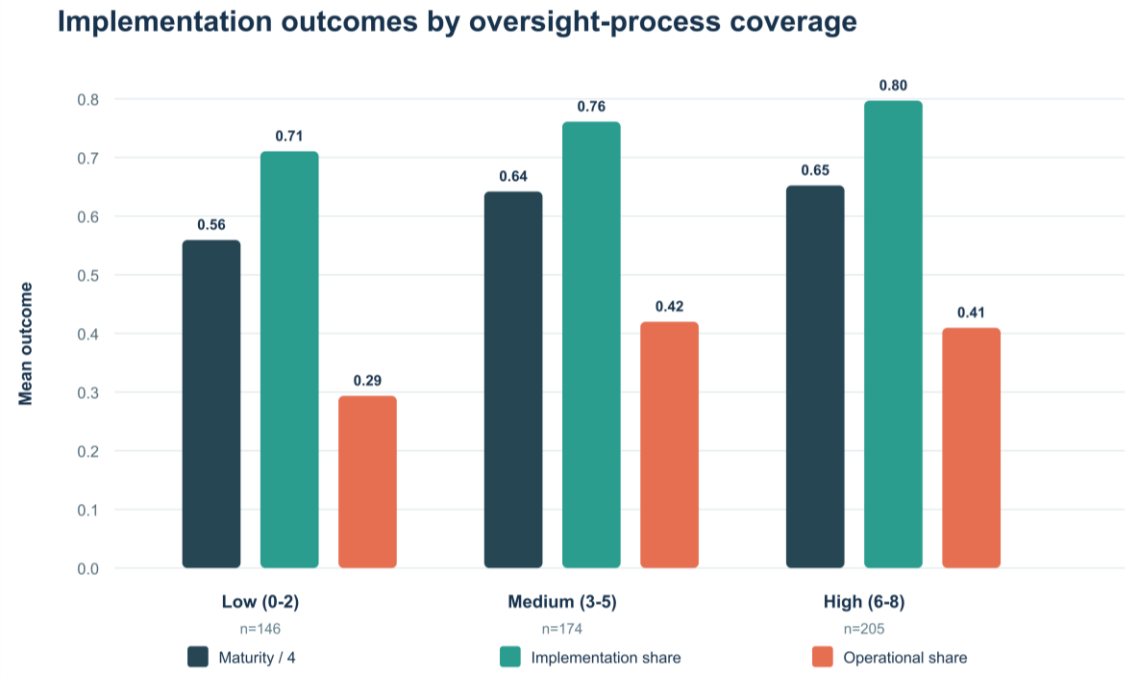

Figure 3: Implementation Outcomes by Oversight Process Coverage

Note. Implementation maturity is divided by four for comparability with the two share outcomes. Bars show unadjusted group means; regression-adjusted threshold estimates appear in Table 3.

Direct comparison of the high- and moderate-coverage groups reveals little additional difference. The high group has only a suggestive advantage of approximately five percentage points in implementation share and no distinguishable advantage in implementation maturity or operational share. The evidence is therefore more consistent with a minimum bundle of institutionalized routines than with a linear claim that every additional process produces an equal gain.

4.4 Processes Associated With Implementation

When the eight processes are estimated separately, interdepartmental information and coordination show the most consistent relationship with the outcomes. After Holm adjustment, interdepartmental coordination remains associated with implementation maturity and implementation share and is suggestively associated with operational share. Council information is retained for maturity, while budgeting and integration into plans and strategies are suggestive for operationalization.

These component results do not imply that any single process independently causes implementation. Indeed, the leave-one-out tests show that removing any one item from the oversight index leaves the aggregate result intact. Across the eight seven-item variants, the weighted implementation-maturity coefficient ranges from 0.175 to 0.201, the implementation-share coefficient from 3.9 to 4.7 percentage points, and the operational-share coefficient from 4.6 to 5.6 percentage points. The evidence supports an institutional bundle rather than a single administrative technique.

4.5 Enabling Administrative Conditions

The administrative-condition estimates in Table 2 show a narrower relationship with implementation. Administrative-factor balance is not consistently associated with the broad implementation-share outcome. Its most stable association is with operational share. In the weighted 2025 model, a one-standard-deviation increase in factor balance is associated with a 3.9-percentage-point increase in operational share. Alternative definitions based on the median, supportive-factor share, net support, and severe constraints produce positive estimates ranging from approximately 3.0 to 3.9 percentage points.

When oversight coverage and administrative-factor balance are entered together, both remain positively associated

with operational share in the 2025 models, although the administrative-factor estimate is less precise in the fractional specification. This pattern is consistent with a distinction between the organizational routines that move actions into implementation and the resources and conditions that help convert them into operation. However, the administrative-factor result is less stable than the oversight result in the multi-year analysis and is therefore treated as secondary.

4.6 Pooled and Lagged Robustness

Table 4 summarizes the longitudinal robustness and scope tests. The pooled models show that the oversight relationship is concentrated in persistent differences among cities. In the weighted Mundlak specification, a one-standard-deviation higher multi-year city average in oversight coverage is associated with 0.146 higher implementation maturity, 3.6 percentage points higher implementation share, and 4.5 percentage points higher operational share. These estimates closely resemble the 2025 cross-sectional results.

Table 4: Longitudinal Robustness and Scope Tests

Outcome	Test	Estimate (SE)	N
Implementation maturity	Pooled between-city component	0.146** (0.049)	1471
Implementation maturity	Pooled within-city component	-0.017 (0.061)	1471
Implementation maturity	Baseline-adjusted lagged model	0.067* (0.031)	939
Implementation maturity	Capacity × hazard severity	-0.061 (0.054)	509
Implementation maturity	Project-pipeline adjusted	0.194*** (0.049)	430
Implementation share	Pooled between-city component	3.637* (1.523)	1471
Implementation share	Pooled within-city component	-1.312 (1.825)	1471
Implementation share	Baseline-adjusted lagged model	1.176 (0.882)	939
Implementation share	Capacity × hazard severity	-1.282 (1.412)	509
Implementation share	Project-pipeline adjusted	4.534** (1.661)	430
Operational share	Pooled between-city component	4.540* (1.764)	1471
Operational share	Pooled within-city component	1.432 (2.578)	1471
Operational share	Baseline-adjusted lagged model	2.087* (0.821)	939
Operational share	Capacity × hazard severity	-2.460 (2.219)	509
Operational share	Project-pipeline adjusted	5.216** (1.657)	430

Note. Pooled models include country and year fixed effects. Lagged models adjust for the baseline outcome. Risk interactions adjust for hazard-reporting depth. Project-pipeline models add the share of finance-seeking projects in implementation. Share outcomes are expressed in percentage points. † p < .10; * p < .05; ** p < .01; *** p < .001.

By contrast, annual deviations from a city's own average oversight coverage are small and statistically indistinguishable from zero. The measures are highly persistent: the approximate intraclass correlation is 0.77 for oversight coverage and 0.88 for administrative-factor balance, and more than half of repeat reporters show no change in either measure over their observed waves. The pooled evidence therefore describes durable institutional differences more convincingly than short-run reform effects.

Baseline-adjusted lagged models produce some positive temporal associations. Oversight coverage in year t is associated with 0.067 higher implementation maturity and a 2.1-percentage-point higher operational share in year t+1 after controlling for the baseline outcome. These relationships are not consistent across transitions, however. They are present in the 2022–2023 and 2023–2024 transitions but absent in 2024–2025. Questionnaire changes, reporting saturation, and sample composition prevent a strong longitudinal interpretation.

4.7 Risk Heterogeneity

Current hazard severity can be calculated for 593 of the 615 cities with codable action status. Mean severity has little correlation with the capacity measures, while the number of hazards reported correlates with oversight breadth and therefore partly reflects reporting depth.

The capacity-by-severity interaction is not statistically distinguishable from zero for implementation maturity, implementation share, or operational share. Adjustment for the number of hazards reported does not change this conclusion. The evidence supports a general institutional-conversion relationship rather than a claim that capacity matters only, or matters more strongly, in cities reporting higher current climate risk.

4.8 Project Pipeline Scope Test

Administrative capacity does not clearly predict the maturity or financing of projects for which cities seek external funding. Neither oversight coverage nor administrative-factor balance is statistically distinguishable from zero in weighted models of project maturity, advanced-project share, project-implementation share, or partial-financing share.

Project progress nevertheless aligns with action progress. A one-standard-deviation increase in the share of finance-seeking projects that have entered implementation is associated with 0.136 higher action implementation maturity and a 3.9-percentage-point higher action implementation share. This provides convergent evidence that the two modules capture related downstream activity.

Adding project implementation progress to the action-outcome models does not attenuate the capacity coefficients. For example, the oversight coefficient for implementation maturity changes from 0.193 to 0.194, and the coefficient for operational share changes from 5.20 to 5.22 percentage points. The finance-seeking project pipeline therefore does not account for the observed oversight relationship. It appears to capture a selective project portfolio that is distinct from the internally funded, regulatory, service-delivery, and organizational actions included in the broader adaptation-action module.

4.9 Summary of Findings

Across the main models, the most robust pattern is that cities with a persistently broader bundle of climate oversight and coordination routines report more mature adaptation-action portfolios. The largest difference occurs between low and moderate institutional coverage, while additional processes beyond a moderate bundle yield limited observable gains. Enabling administrative conditions are most clearly related to the stricter outcome of operationalization, but this relationship is less stable across years. Neither risk severity nor the finance-seeking project pipeline explains the central oversight relationship.

These estimates remain observational. Selection weighting, country fixed effects, alternative outcome models, and pooled decompositions reduce several specific concerns, but they do not eliminate unobserved differences in political commitment, administrative quality, fiscal resources, or reporting behavior. The results should therefore be interpreted as global comparative evidence consistent with an institutional conversion-capability argument, not as estimates of the causal effect of adding administrative procedures.

5. DISCUSSION

This article asked why some cities appear better able than others to convert climate plans into implemented and operating adaptation actions. Across the 2025 models, the most consistent answer is not simply that successful cities possess more technical information or report more favorable administrative conditions. It is that climate responsibility is embedded across a broader set of oversight and coordination processes. Cities with more extensive integration into budgeting, management, political oversight, interdepartmental information, risk management, planning, and performance systems report more mature action portfolios, larger implementation shares, and larger operational shares.

The result supports an institutional interpretation of urban adaptation capacity. Climate implementation is not only a technical response to physical risk. It is also an administrative and political process through which attention, authority, and resources are allocated among competing municipal priorities. A climate plan can express ambition without changing who controls budgets, which departments exchange information, how managers are held accountable, or whether elected bodies receive implementation information. The oversight measure captures the extent to which climate responsibility enters these ordinary systems of municipal government.

6.1 From Isolated Resources to Institutionalized Conversion Capability

The findings extend policy-capacity research by showing why individual resources may be insufficient for cross-cutting implementation. Policy capacity combines analytical, operational, and political competences at multiple levels (Wu et al., 2015). Integrative capacity additionally depends on coordination, institutional architecture, accountability, and resourcing (Vince et al., 2024). The urban adaptation results are consistent with these multidimensional approaches. No single oversight item accounts for the main relationship. Removing budgeting, interdepartmental coordination, council information, or any other individual component leaves the aggregate coefficient substantively intact.

This does not mean that the components are interchangeable. The exploratory item models identify interdepartmental coordination as the most consistent correlate of implementation maturity and implementation share. Budgeting and integration into plans and strategies appear more relevant to the strict operational outcome. These patterns fit a sequential interpretation. Information exchange and responsibility may help an organization initiate implementation across departments, while budgets and formal planning systems help sustain an action until it becomes operational. Yet the multiple-testing results also counsel against identifying a single administrative "best practice." Implementation capacity appears to arise from combinations of routines.

This interpretation complements adaptation-mainstreaming research. Previous studies show that adaptation can remain shallow when it is added to policy documents without changing routines, instruments, or responsibilities (Uittenbroek et al., 2013; Uittenbroek, 2016; Runhaar et al., 2018; Skagen & Boasson, 2024). The current analysis demonstrates a similar distinction using a global comparative design. Formal plan adoption is widespread in the reporting sample, while downstream implementation continues to vary with the breadth of institutional embedding.

6.2 A Minimum Institutional Bundle Rather Than Procedural Maximization

The threshold result provides an important qualification. Cities with moderate and high oversight coverage both outperform cities with weak coverage, but high-coverage cities do not consistently outperform the moderate group. The evidence therefore does not support a simple claim that more procedures always produce better outcomes.

One interpretation is that adaptation requires a minimum institutional bundle. When climate responsibility is connected to only one or two organizational processes, critical gaps may remain between political attention, managerial authority, departmental coordination, and resource allocation. Establishing several complementary processes gives adaptation an administrative route from plan to delivery. Beyond that point, cities can rely on different institutional configurations, and additional procedures may duplicate existing functions.

This finding contributes to coordination research, which emphasizes that organizational effectiveness depends on fit rather than the accumulation of coordinating structures. Whole-of-government and network arrangements can reduce fragmentation, but they can also increase transaction costs or become ceremonial if responsibilities remain unclear (Christensen & Lægreid, 2007; Provan & Kenis, 2008). The practical implication is not that every municipality should reproduce all eight processes. Cities should identify whether their existing configuration connects the essential functions of authorization, budgeting, coordination, monitoring, and political accountability.

The threshold result also improves interpretation of the index itself. A positive continuous coefficient could otherwise be read as support for administrative expansion. The categorical results instead suggest that the central contrast is between weak institutionalization and the establishment of a workable governance architecture. This is a more limited and plausible claim.

6.3 Operationalization and Enabling Administrative Conditions

The secondary administrative-factor measure is most consistently related to operational share. Cities reporting more supportive fiscal, technical, institutional, political, participatory, and infrastructure conditions do not necessarily report a substantially larger share of actions that have entered implementation. They do, however, report a larger share that have become operational.

This distinction suggests that implementation initiation and operationalization impose different demands. Cities can begin projects through temporary grants, pilot programs, external partnerships, or political initiatives. Converting those activities into operating services, infrastructure, or organizational practices requires durable staffing, resources, authority, and institutional support. The consistency of this result across alternative factor definitions strengthens the stage-specific interpretation.

At the same time, administrative-factor balance is less robust than oversight coverage. It weakens in joint pooled models and shows no stable within-city relationship. Self-reported enabling conditions may also reflect general optimism, political commitment, or the performance being explained. The evidence therefore justifies treating administrative conditions as a secondary explanation of operationalization, not as an equally strong general predictor.

6.4 Persistent Institutional Differences and the Limits of Short Term Change

The pooled analysis shows that the main relationship is concentrated in differences among cities with persistently different oversight arrangements. Multi-year average oversight coverage predicts implementation outcomes, while annual deviations from a city's own average do not. More than half of repeat-reporting cities show no change in oversight count, and adjacent-year values are highly correlated.

This pattern is consistent with the concept of institutional capacity. Budgeting systems, departmental responsibilities, political reporting relationships, and performance-management arrangements usually develop over several years. They are not policy instruments that can be switched on and expected to change an action portfolio within a single reporting cycle. Capacity-building initiatives that provide one-off training or require a new document may therefore have limited effects unless they alter durable organizational relationships.

The pooled result also limits the strength of the paper's inference. Persistent oversight arrangements may proxy for stable characteristics that are only partly observed, including political commitment, general bureaucratic quality, fiscal autonomy, or long-standing participation in transnational climate networks. Country fixed effects and baseline-adjusted models reduce some concerns but cannot eliminate this possibility. The inconsistent transition-specific results reinforce the need for caution. The analysis supports a relationship between institutional configuration and implementation; it does not establish the short-run causal effect of adding an oversight procedure.

This limitation points to a useful research agenda. Future studies need repeated organizational measures that record when responsibilities, budget rules, and coordination mechanisms are introduced, along with stable action identifiers and implementation dates. Such data would make it possible to distinguish institutional reform from reporting changes and to estimate the time required for capacity improvements to affect delivery.

6.5 What the Null Results Reveal About Risk and Finance

The absence of risk moderation is theoretically informative. Cities reporting more severe hazards do not show a stronger capacity–implementation relationship. Climate pressure may increase attention or demand for action, but it does not appear to substitute for the administrative systems needed for delivery. Nor does the evidence show that institutional capacity becomes relevant only when risk is high. Within this reporting sample, conversion capability appears to be a general feature of implementation.

This conclusion remains provisional because the hazard measure is self-reported and contemporaneous. Objective heat, precipitation, wildfire, and flood exposure may produce different results. Nevertheless, the null interaction discourages a crisis-response interpretation in which cities develop implementation capacity only after severe hazards become salient. Institutional arrangements may need to exist before acute pressure occurs.

The finance-pipeline results also refine the central argument. Project implementation progress aligns with action implementation, indicating that the two disclosure modules capture related downstream activity. However, oversight and administrative-factor measures do not clearly predict project maturity or partial financing, and project progress does not attenuate the oversight coefficient.

This finding is consistent with research showing that urban climate-finance initiatives select cities and projects according to bankability, risk, and the requirements of external financiers (Grafe et al., 2025). Finance-seeking projects are not a neutral representation of the entire adaptation portfolio. Regulatory reforms, emergency services, public-health programs, maintenance practices, land-use decisions, and internally financed activities may depend heavily on municipal administrative capability without entering an external project pipeline. The result therefore separates two related governance problems: institutional conversion within municipal government and the preparation of projects for external finance.

6.6 Implications for Cities and Capacity Building Organizations

The results suggest that capacity-building should focus less on the production of additional stand-alone plans and more on institutional connections. For cities with weak oversight coverage, the priority is to establish a basic configuration linking climate responsibility to management, interdepartmental coordination, budgeting or capital planning, risk systems, and political reporting. The threshold evidence suggests that closing fundamental gaps may

yield more value than maximizing the number of procedures.

National governments and city networks can support this process by providing model budget classifications, common reporting protocols, cross-departmental governance templates, and technical assistance that connects climate teams to finance, planning, public works, health, and emergency management. Multilevel support remains important because local governments often lack authority over infrastructure, revenue, or regulatory instruments (Betsill & Bulkeley, 2006; Clar, 2019). External programs should therefore evaluate whether their assistance changes municipal operating systems, not only whether it produces a plan or project concept.

For climate-finance organizations, the findings caution against treating project preparation as the only relevant capacity problem. Improving feasibility studies and financial structuring may help selected investments, but it may not strengthen the administrative systems through which cities implement a broader adaptation portfolio. Project-preparation support should be connected to local budgeting, procurement, departmental responsibility, and long-term operation rather than organized solely around investor-facing bankability.

6.7 Limitations

Several limitations define the scope of the conclusions. First, CDP participation and action-status reporting are selective. Inverse-probability weights adjust for observed differences among respondents but cannot represent cities that do not participate or address selection based on unobserved political commitment and administrative quality. The results apply to climate-engaged cities reporting through CDP–ICLEI Track.

Second, capacity and implementation are self-reported in the same disclosure system. Cities with stronger reporting systems may provide both more complete governance information and more mature action descriptions. Country fixed effects, alternative capacity definitions, and leave-one-item-out tests reduce but do not eliminate common-method bias.

Finally, the global design trades contextual precision for comparability. Identical administrative processes can operate differently across political and legal systems. The country-fixed-effects results show that the main oversight association is not entirely driven by national differences, but detailed comparative research is needed to explain which institutional configurations work under particular forms of decentralization, fiscal authority, and local democracy.

6. CONCLUSION

The global spread of urban climate plans has shifted the central research question from whether cities recognize climate risk to whether they can deliver sustained adaptation. This article argues that delivery depends partly on administrative conversion capability: the institutional arrangements through which climate priorities enter budgeting, management, political oversight, interdepartmental coordination, risk systems, planning, and performance management.

Using 2022–2025 CDP–ICLEI Track disclosures, the analysis finds that cities with persistently broader oversight and coordination arrangements report more mature adaptation portfolios, larger shares of actions in implementation, and larger shares in operation. The relationship survives disclosure-selection adjustment, country fixed effects, fractional outcome models, alternative index construction, and pooled between-city analysis. It is also robust to removing any single oversight component.

The pattern is nonlinear. The largest difference lies between low and moderate oversight coverage, while maximal coverage offers limited additional advantage over a moderate institutional bundle. This result favors a minimum-institutionalization interpretation over procedural maximization. Enabling administrative conditions are most clearly related to the final transition into operation, but this secondary relationship is less stable across years.

Neither reported hazard severity nor the finance-seeking project pipeline explains the main oversight relationship. Climate pressure does not automatically produce implementation, and external project readiness captures only part of the adaptation portfolio. Municipal administrative conversion and project bankability are related but distinct governance challenges.

The findings show that climate-engaged cities with more deeply embedded oversight and coordination systems

also report stronger downstream delivery. For policy, the implication is to move beyond stand-alone plans and short-term capacity workshops toward durable connections among climate priorities, administrative authority, budgets, departments, and accountability systems. For research, the next challenge is to build longitudinal data capable of tracing specific institutional reforms to stable actions and, ultimately, to reductions in climate vulnerability.

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