STRENGTHENING INSTITUTIONAL CAPACITY BUILDING FOR A SUSTAINABLE IMPLEMENTATION OF PUBLIC INFRASTRUCTURE GOVERNANCE – A SOUTH AFRICA CASE STUDY

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Abstract

Infrastructure governance in South Africa focuses on the interaction between internal governance systems and collaborative governance mechanisms. The study adopts a qualitative, secondary-data-based research approach to analyse how internal governance systems, including leadership, performance oversight, risk management, ethical accountability, and knowledge management, interact with collaborative governance arrangements to influence infrastructure governance outcomes. This paper examines institutional capacity building as a foundational determinant of sustainable public infrastructure. It draws on thematic analysis of academic literature, policy documents, institutional and audit reports, and international case studies, synthesising fragmented evidence into an integrated analytical framework. The findings indicate that institutional capacity constraints in South Africa are not primarily the result of policy gaps, but rather of weak implementation driven by fragmented governance arrangements, politicised decision-making, limited professional and technical capacity, and poorly integrated data and monitoring systems. While collaborative governance offers opportunities for improved coordination and legitimacy, its effectiveness is constrained where internal governance systems lack accountability, professional capacity, and institutional resilience. The paper highlights the need to shift from compliance-driven governance towards adaptive, data-driven, and professionally managed infrastructure systems, supported by integrated monitoring, clear accountability, and protected technical capacity. The conceptual framework provides a structured basis for future empirical testing and policy reform to strengthen sustainable infrastructure governance in South Africa. Such reforms are critical to ensuring resilience, efficiency, and long-term sustainability in the country's infrastructure sector.

Keywords: Institutional capacity building, Collaborative governance, Internal governance, Infrastructure governance.

INTRODUCTION

South Africa's persistent infrastructure failures reflect a deeper institutional and governance challenge rather than isolated technical or financial constraints (Wall, 2024). Despite progressive policy frameworks, infrastructure delivery continues to be undermined by fragmented governance, weak institutional capacity, politicised decision-making and inadequate monitoring and maintenance systems (Doe & Smith, 2024). Existing literature recognises the importance of institutional capacity and collaborative governance in addressing complex public-sector challenges. However, these strands are often treated separately, with limited integration between internal governance systems and collaborative governance arrangements (Emerson et al., 2012). As a result, insufficient attention has been paid to how institutional capacity-building shapes the effectiveness of collaborative governance in infrastructure delivery (SAICE, 2025). This paper aims to develop an integrated governance framework to support the implementation of sustainable and equitable public infrastructure in South Africa.

The objectives are to:

- Analyse institutional capacity constraints affecting infrastructure governance
- Examine the role of internal governance systems and collaborative governance mechanisms
- Propose a conceptual framework linking internal governance capacity to sustainable infrastructure outcomes.

Despite extensive research on infrastructure governance and institutional capacity in South Africa, persistent infrastructure failures indicate unresolved theoretical and operational gaps (Wall, 2024). Existing studies consistently identify weak institutional capacity, fragmented governance arrangements, limited intergovernmental coordination and inadequate monitoring and evaluation systems as key constraints to effective infrastructure delivery (Maumela et al., 2025). However, much of the literature addresses these challenges in isolation, rather than analysing them as interconnected, mutually reinforcing governance failures (Lieberman, 2011).

A central gap lies in the absence of integrated analytical frameworks that systematically link internal governance systems such as leadership, accountability, performance oversight, financial, risk and performance and knowledge management with collaborative governance arrangements involving multiple stakeholders (Maumela et al., 2025). While collaborative governance is frequently promoted as a response to complex public-sector challenges, limited attention has been paid to the extent to which its effectiveness depends on the strength of internal institutional capacity (Foli, 2025).

Another significant gap concerns the operationalisation of intergovernmental coordination and data integration. Although the literature recognises siloed planning, fragmented mandates, and poor data sharing as drivers of infrastructure failure, there is limited guidance on how to institutionalise coordination mechanisms and integrated information systems across government spheres (Manda, 2020).

The literature further reveals a weak empirical and conceptual treatment of political economy dynamics, particularly political interference, patronage networks, and short-term incentives that undermine professional decision-making, maintenance planning, and accountability (Mabizela, 2024). While these dynamics are often acknowledged, they are rarely incorporated systematically into institutional capacity-building and governance frameworks (SAICE, 2025).

Lastly, there is limited evidence of synthesis on how institutional capacity-building interventions improve infrastructure lifecycle management and service delivery outcomes across diverse municipal contexts (DeCorby-Watson et al., 2018). Existing approaches tend to prioritise technical training and compliance requirements, with comparatively less emphasis on systematic governance reforms, adaptive learning and institutional resilience (Nzewi, 2025).

This paper addresses these gaps by developing an integrated conceptual framework that connects internal governance capacity, collaborative governance mechanisms and political-institutional context. In doing so, it provides a structured analytical basis for understanding persistent infrastructure governance failures and for guiding future empirical research and policy reform in South Africa.

The paper is structured to review the literature on institutional capacity building, infrastructure governance, and collaborative governance. It is followed by an outline of the research methodology and presentation of key analytical findings derived from secondary data. It then develops an integrated conceptual framework and concludes with policy implications and directions for future research.

INSTITUTIONAL CAPACITY AND INFRASTRUCTURE GOVERNANCE: CONCEPTUAL AND THEORETICAL PERSPECTIVES

This section reviews the conceptual narrative literature, supported by a thematic synthesis, examining the relationships among institutional capacity building, infrastructure governance, and collaborative governance. The purpose was to synthesise fragmented theoretical, policy and empirical insights to inform the development of an integrated governance framework. Priority was given to peer-reviewed literature, South African policy documents, institutional reports, and international governance studies. Sources that focused solely on technical engineering analysis, without governance analysis, were excluded.

The analysis for the review was thematic, identifying recurring governance and capacity determinants that informed the development of the conceptual framework.

Institutional Capacity Building in the Public Sector

Institutional capacity building has evolved from a narrow emphasis on technical skills development towards a systematic understanding that prioritises organisational systems, governance structures and institutional resilience (Emam et al., 2025). Early capacity-building approaches assumed that training and skills transfer would improve public-sector performance. Subsequent research, however, demonstrates that technical capacity alone produces limited and unsustainable outcomes in the absence of effective leadership, accountability mechanisms, coordinated structures, and adaptive learning systems (Matlala, 2025). Contemporary scholars conceptualise institutional capacity as a multidimensional construct shaped by organisational design, decision-making processes and broader political-institutional conditions (Woodhill, 2010).

In the South African public sector, institutional capacity building is closely linked to efforts to address infrastructure backlogs, service delivery failures and historical inequalities (Wall, 2024). Despite comprehensive policy and legislative reforms, capacity constraints persist due to fragmented mandates, weak professionalisation, unstable leadership, limited intergovernmental coordination and poor integration of data and monitoring systems (Boyce & Mbanga, 2025). These constraints highlight the limitations of skills-based interventions and underscore the need for integrated institutional reforms that strengthen internal governance systems, enable coordination across government spheres and support adaptive, performance-oriented infrastructure governance (Lukat et al., 2022).

Infrastructure Governance

Understanding Infrastructure Governance as a Public Good Entity:

Infrastructure development as a public good is intrinsically linked to equity, efficiency, and sustainability (OECD, 2017; OECD, 2021). Infrastructure serves as a public good by providing non-excludable, non-rival services such as transportation, water, sanitation, energy, and digital connectivity. These services are fundamental to economic participation, social inclusion, and overall societal well-being. Consequently, infrastructure governance is pivotal in shaping equitable development outcomes.

Recent empirical research indicates that the distribution of infrastructure assets significantly influences social equity (Wu & Liu, 2022). Marginalised and historically disadvantaged communities continue to face infrastructural deficits, perpetuating spatial and socio-economic inequalities (Tsile, 2025). Moreover, studies reveal that prioritising equity in infrastructure investment does not compromise efficiency; rather, a well-designed equity-focused allocation can reduce disparities in service quality with minimal impact on average system performance. Additionally, frameworks that incorporate equity into planning ensure that disadvantaged communities receive fair access, bridging historical gaps and fostering inclusive development (Fobosi & Malima, 2025).

Efficiency in infrastructure governance aims to maximise social returns on investment through integrated planning, lifecycle management, and performance measurement. Sustainability further demands that infrastructure systems serve both present and future generations while minimising harm to the environment, society, and the economy. Governance frameworks that integrate equity and Sustainability into planning and decision-making processes are thus essential for long-term infrastructure resilience (OECD, 2023).

Defining Infrastructure Governance from a planning, coordination, accountability, and maintenance perspective:

Infrastructure governance (IG) from the perspectives of planning, coordination, accountability, and maintenance is guided by frameworks, processes, and systems that shape how infrastructure is conceived, developed, operated, and sustained within the public sector (OECD, 2020; OECD 2025). It is regarded as the integrated management of planning, coordination, accountability and maintenance that ensures sustainable, reliable and equitable infrastructure services.

Planning in IG uses systematic strategies to identify needs, set priorities, allocate resources, and integrate infrastructure with broader development goals (OECD, 2025). It addresses both new investments and ongoing lifecycle needs. It prevents fragmentation and aligns the project with local conditions and long-term objectives.

Strong coordination processes in IG involve aligning actions among diverse stakeholders to ensure coherence in decision-making, data sharing, and responsibility allocation, thereby avoiding duplication of effort, policy overlaps, and service delivery failures. IG mandates transparency at every phase, from procurement through to operations and outcomes. Its emphasis is on monitoring, evaluation and the enforcement of regulatory standards (OECD, 2020). Maintenance is prioritised under IG because asset longevity depends on ongoing care. It prioritises routine maintenance alongside new investments, with clear operational responsibilities, capacity-building and adequate budgeting. Neglect in these areas leads to service delivery interruptions and long-term cost increases (Mangai et al., 2025).

Infrastructure Governance and Its Link to Institutional Fragmentation and Political Interference:

Infrastructure governance encompasses the systems, processes, and institutional arrangements that steer infrastructure planning, coordination, accountability, and maintenance throughout the project lifecycle (OECD, 2023). Effective governance in this area requires aligning strategic planning, resource allocation, implementation, and long-term management, supported by clear accountability mechanisms and reliable performance monitoring. The literature consistently highlights institutional fragmentation as a key factor contributing to infrastructure failures in South Africa (Wall, 2024). This fragmentation arises when government departments and agencies operate within isolated departmental structures, with unclear role delineation and weak intergovernmental coordination, thereby undermining coherent planning and maintenance across national, provincial, and municipal levels (OECD, 2025). These structural weaknesses are further exacerbated by inconsistent monitoring and evaluation systems and poor data integration, which hinder institutions' ability to track performance, manage risks, and support adaptive decision-making.

Political interference compounds governance fragmentation, as patronage-based appointments, short-term political incentives, and the prioritisation of new capital projects over maintenance disrupt professional decision-making and weaken accountability. Consequently, infrastructure governance failures reflect not only technical shortcomings but also deeper institutional and political economy constraints (Mangai et al., 2025).

COLLABORATIVE GOVERNANCE AS A GOVERNANCE RESPONSE

Collaborative governance has emerged as a significant response to complex public-sector challenges that exceed the capacity of individual institutions. It emphasises inclusive decision-making, stakeholder participation, and shared responsibility across government, the private sector, and civil society. The literature suggests that collaborative governance can enhance legitimacy, coordination, and problem-solving capacity by mobilising diverse resources and knowledge (Ansell & Gash, 2008).

However, its effectiveness depends heavily on institutional design, leadership, power balance, and the capacity of participating institutions when internal governance systems are weak; collaborative arrangements risk becoming mere consultative exercises with limited impact on implementation. In the South African context, collaborative governance is often advocated to tackle infrastructure delivery challenges and concerns about community legitimacy. However, evidence suggests that collaboration cannot replace weak internal governance. Without strong leadership, accountability mechanisms, and professional capacity within public institutions, collaborative processes are unlikely to improve infrastructure outcomes (Musekiwa, 2024).

Core Principles of Collaborative Governance

The core principles of collaborative governance are rooted in accountability, redefining it in multi-actor contexts where government, nonprofit organisations, the private sector, and civil society jointly design, implement, and share responsibility for policy and service outcomes (Ansell & Gash, 2008). This accountability model establishes horizontal and vertical accountability relationships across networked actors, rather than relying solely on hierarchical state control. Its effectiveness requires the participation of diverse stakeholders who represent varied perspectives and ensure equitable representation in decision-making. Stakeholder participation in the decision-making process empowers them to shape outcomes, which can lead to stronger governance outcomes. This translates into adaptive management, where successful collaborations engage in continuous social learning, conflict resolution, and institutional adaptation. This reorientation results in the engagement of diverse interests, the maintenance of internal and external legitimacy, the fostering of shared learning, and the access to shared resources.

Overall, collaborative governance serves as a structural bridge, strengthening state capacity by making diverse expertise, resources, and problem-solving capabilities accessible, while building stakeholder legitimacy through inclusive participation, transparent decision-making, and shared ownership (Emerson, Nabatchi & Balogh, 2012; Emerson & Nabatchi, 2015). This dual legitimacy enhances both governmental effectiveness and public trust, addressing governance failures rooted in institutional fragmentation and democratic deficits (Ansell & Gash, 2008).

Integrating Internal Institutional Governance and Collaborative Governance

While institutional capacity building and collaborative governance are well-established in the literature, they are often treated as separate analytical domains. Limited attention has been given to how internal governance systems interact with collaborative arrangements within specific political and institutional contexts (Emerson et al., 2012). Emerging governance literature highlights the importance of integrating internal control systems, such as risk management, performance oversight, and knowledge management, with participatory and collaborative mechanisms. Such integration enables institutions to balance accountability and inclusiveness, align internal decision-making with external stakeholder engagement, and support adaptive governance processes (Ludovico et al., 2025). This study builds on these insights by synthesising literature on institutional capacity, infrastructure governance, and collaborative governance into an integrated analytical framework. The framework addresses identified gaps by explicitly linking internal governance capacity, collaborative mechanisms, and the political institutional context to sustainable infrastructure outcomes.

CHALLENGES IN INSTITUTIONAL CAPACITY BUILDING

Empirical and conceptual challenges that hinder capacity building in infrastructure governance include sparse, unreliable data from agencies that often lack systematic performance and financial records (OECD, 2017). This makes it hard to diagnose capacity gaps or track improvements. Another identified challenge is fragmented financing, in which multiple funding streams, such as central budgets, regional allocations, and donor aid, generate coordinated bottlenecks and inconsistent budgeting, limiting long-term planning. High staff turnover erodes institutional memory and technical expertise, weakening continuity in governance processes. Irregularities in procurement and opaque contracting undermine the effectiveness of oversight and divert resources from service delivery (Duja, 2025). Scholars differ on whether capacity refers to structural resources such as budgets and staff, functional abilities such as decision-making and learning, or both, resulting in inconsistent assessment frameworks. Decentralised government entities for planning, financing and operations prevent integrated decision-making and knowledge sharing across departments. Limited adaptive learning agencies lack formal feedback loops, experimentation mechanisms and platforms for disseminating lessons. This restricts the ability to technically evolve or adapt to social changes (Adom & Simatele, 2024).

Empirical gaps such as poor data, fragmented funding, staff churn, and corruption undermine institutions' practical ability to perform, while conceptual ambiguities, including unclear capacity definitions, siloed structures, political short-termism, and weak learning, hinder the design of effective capacity-building strategies. Together, they create a cycle in which weak measurement feeds into poorly coordinated reforms and unclear objectives, preventing the establishment of robust, evidence-based governance. By addressing both dimensions, that is, improving data systems, stabilising human resources, clarifying capacity metrics and fostering integrated learning-oriented institutions, offers a pathway to a stronger public infrastructure governance.

GLOBAL AND REGIONAL PERSPECTIVES ON CAPACITY BUILDING IN INFRASTRUCTURE GOVERNANCE

Comparative international experiences demonstrate that sustainable infrastructure governance depends less on the volume of investment and more on the strength of institutional capacity, governance coordination and accountability mechanisms. Countries that have achieved consistent infrastructure performance typically exhibit professionalised public administrations, clear role delineation, robust project appraisal systems and integrated monitoring and evaluation frameworks (OECD, 2017)

One cited example is Chile's national investment system (Sistema Nacional de Inversiones), which provides a structured framework for planning, evaluating, and prioritising public infrastructure investments (World Bank, 2017).

The system standardises project appraisal, separates evaluation from implementation functions and embeds accountability through clear institutional checks and balances. Evidence indicates that this approach has contributed to improved project selection, cost control and continuity in infrastructure delivery. According to the OECD (2017), the Chilean case also illustrates how institutionalised governance processes, rather than isolated technical reforms, strengthen long-term infrastructure outcomes.

Similar lessons emerge from other high-performing governance contexts, including Singapore, where sustained investment in institutional capacity, the professionalisation of the public service, and integrated planning systems underpin infrastructure performance (World Bank, 2017). These cases reinforce the importance of coherent governance architecture, merit-based administration, and long-term planning horizons over ad hoc or politically driven interventions.

Experiences from the Global South and African contexts further highlight the role of political economy conditions in shaping capacity-building outcomes. While policy frameworks often mirror international best practice, weak enforcement, patronage networks and limited administrative autonomy frequently undermine implementation. Comparative studies across African countries show that institutional capacity is closely linked to governance quality, accountability mechanisms and the insulation of technical functions from political interference (Hutchison & Johnson, 2011; Dzreke & Dzreke, 2025).

These international and regional experiences for South Africa underline that no single governance model can be transplanted wholesale. However, consistent lessons point to the need for integrated institutional reforms that strengthen internal governance systems, professionalise public administration, institutionalise coordination across government spheres and embed data-driven monitoring and evaluation. These insights inform the development of the conceptual framework proposed in this paper, which adapts international governance principles to Africa's specific political, institutional and historical context.

The literature widely agrees that the governance of sustainable infrastructure relies more on institutional capacity, governance integration, and the political–institutional context than on policy design or technical expertise alone (OECD, 2017; World Bank, 2017). Although institutional capacity building and collaborative governance are well-established, they are often treated as distinct, with limited attention to how internal governance systems influence the effectiveness of collaboration. Ongoing weaknesses in leadership, accountability, coordination, data integration, and adaptive learning, exacerbated by political economy dynamics, continue to undermine infrastructure outcomes. This body of work highlights the need for an integrated analytical framework that connects internal governance capacity, collaborative governance mechanisms, and contextual conditions to better explain governance failures and guide sustainable infrastructure reform (Musekiwa, 2024).

RESEARCH METHODOLOGY

The research approach

This study adopted a qualitative, interpretivist research approach to examine institutional capacity building and sustainable infrastructure governance in South Africa. An interpretivist paradigm is appropriate because governance, institutional capacity and collaboration are socially constructed phenomena shaped by context, power relations, organisational norms and policy environments (Bryman, 2016). Understanding these dynamics required interpretation rather than quantitative measurement. It is also exploratory and conceptual, aiming to synthesise existing knowledge and develop an integrated governance framework rather than test predefined hypotheses or generate new empirical data.

The research design

The research follows a secondary data-based qualitative research design, relying exclusively on documentary and literature analysis. The design is suitable given the extensive availability of high-quality secondary sources on public infrastructure governance, institutional capacity and governance reform in South Africa and comparable international contexts. The study is further positioned as a conceptual synthesis and analytical review that integrates fragmented theoretical policy and empirical insights into a coherent framework for sustainable infrastructure governance (Bowen, 2009; Yin, 2018).

Secondary data were drawn from a wide range of authoritative sources to ensure depth, credibility, and triangulation.

The sources included:

- Peer-reviewed academic literature on institutional capacity building, collaborative governance, infrastructure governance and public sector performance and accountability.
- South African policy and legislative documents on national development and infrastructure, governance, public finance, and monitoring and evaluation frameworks.
- The institutional and audit reports from the National Treasury, the Auditor-General of South Africa, and sector departments and oversight bodies. International and comparative case studies from multilateral organisations, development finance institutions and global governance and infrastructure research bodies.
- Grey literature that covered topics on policy briefs, governance diagnostics and infrastructure performance reviews.

Data analysis

Data were analysed using a qualitative thematic analysis supported by a framework aligned with the study's theoretical foundations. The analysis followed four stages based on Braun and Clark (2006). The relevant literature, policy documents, and institutional reports were reviewed to identify recurring themes in governance and institutional capacity. Second, the material was coded and categorised into analytical domains, including leadership and ethics, technical capacity, financial and risk management, knowledge management, intergovernmental coordination and collaborative governance mechanisms. Third, relations between these domains and infrastructure governance outcomes were examined. Finally, insights from the thematic analysis were synthesised to develop an integrated conceptual framework that links institutional capacity, collaborative governance, and political-institutional context to sustainable infrastructure outcomes. This combined approach enabled systematic interpretation of diverse sources while maintaining conceptual coherence. This approach also enabled a systematic interpretation of diverse sources while maintaining conceptual coherence.

The four-stage approach unfolded as follows (Braun & Clark, 2006):

- Familiarisation with both the literature and documents to identify recurring governance and capacity-related issues.
- Coding categorisation of data into core analytical domains that included:
    - Leadership and ethics
    - Human and technical capacity
    - Financial and risk management
    - Data systems and knowledge management
    - Intergovernmental coordination
    - Collaborative governance mechanisms

The coding framework was developed using a combination of deductive and inductive approaches. Initial analytical domains were derived deductively from the study's theoretical foundations, particularly from the literature on institutional capacity building, infrastructure, and collaborative governance. These theoretical constructs informed the preliminary coding categories, including leadership and ethics, technical and human capacity, financial and risk management, knowledge management, intergovernmental coordination and collaborative governance mechanisms.

As part of the review process, analysis of academic literature, policy documents, and institutional reports identified additional governance challenges and relationships inductively, allowing the coding framework to be refined and expanded. This hybrid approach enabled the analysis to remain theoretically grounded while capturing recurring empirical patterns within the literature.

- Pattern Identification examined the relationships between institutional capacity, governance arrangements, political economy factors and infrastructure outcomes.
- The conceptual synthesis integrated insights across domains to construct an integrated framework for sustainable infrastructure governance.

The adoption of this analytical strategy enabled the study to move from a descriptive review to explanatory and integrative insights.

Research Limitations

Limitations of the study, stemming from its exclusive reliance on secondary data, meant that some documentary sources focused more on formal governance arrangements than on everyday institutional practices, and politically sensitive dynamics were underreported in official documents. The study did not empirically test the proposed framework through primary data or case-based application. Despite this, the limitations were consistent with the study's conceptual scope, as the framework was intended as a foundation for future empirical research, including case studies and stakeholder-based investigations that can validate and refine its components.

Ethical considerations

As the study relied solely on publicly available secondary sources, it does not involve human participants and therefore does not require formal ethical clearance. All sources are appropriately cited, and interpretations are presented transparently to maintain academic integrity.

RESEARCH RESULTS

The thematic and framework analysis of the literature and documentary sources yielded five interconnected findings that explain the persistent failures in infrastructure governance in South Africa and inform the proposed Sustainable Infrastructure Governance Framework. Institutional capacity deficits are systemic; hence, infrastructure failures are not primarily due to policy gaps or resource scarcity but stem from broader institutional weaknesses.

These weaknesses extend beyond mere shortages of technical skills to encompass fragmented organisational systems, unstable leadership, weak accountability structures, limited financial and risk management capacity, and inadequate adaptive learning mechanisms. Capacity deficits inform governance domains and reinforce one another, illustrating that institutional capacity must be viewed as an integrated, multidimensional construct.

Governance fragmentation and political interference undermine delivery. This is confirmed by the analysis showing that fragmented mandates, siloed departmental structures, weak intergovernmental coordination, and inconsistent regulatory enforcement hinder coherent infrastructure planning and lifecycle management. These structural weaknesses are exacerbated by political interference, patronage-based appointments, and short-term incentives that prioritise new capital projects over maintenance. Consequently, infrastructure decline reflects failures in governance architecture rather than isolated administrative shortcomings.

Weak financial and performance management accelerate asset deterioration. Financial mismanagement, under-expenditure on maintenance, tariff dysfunction, procurement irregularities, and fragmented funding streams undermine sustainability and infrastructure performance. The lack of structured financial risk assessment within medium-term planning leads to reactive budgeting and weak lifecycle oversight. Similarly, limited performance monitoring constrains adaptive management and accountability. Therefore, embedding integrated financial risk and performance management systems is central to sustainable infrastructure stewardship.

Data fragmentation limits adaptive governance by creating disjointed data systems, insufficient cross-departmental information sharing, and constrained analytical capacity, hindering evidence-based decision-making.

Weak monitoring and evaluation systems obstruct early detection of infrastructure risks and restrict institutional learning. The findings highlight the importance of integrated digital systems and institutionalised feedback loops in improving transparency, coordination, and adaptive governance.

Collaborative governance is necessary but not sufficient, as mechanisms such as private-public partnerships and intergovernmental coordination forums can enhance legitimacy and resource mobilisation. However, analysis shows that collaboration cannot make up for weak internal governance systems. Without strong leadership, contract management skills, financial oversight, and independent accountability mechanisms, partnerships become unstable and shift risk back to the public sector. Therefore, collaborative governance acts as a supporting mechanism rather than a replacement for strong institutional capacity.

The analytical findings collectively demonstrate that infrastructure failures are interconnected and systemic. Leadership deficits, financial mismanagement, data fragmentation, weak oversight, and political interference reinforce one another. Sustainable infrastructure governance requires integrated reforms that strengthen internal institutional capacity, financial and performance management systems, intergovernmental coordination, data integration, and collaborative governance mechanisms. These findings provide the empirical and analytical basis for developing the Sustainable Infrastructure Governance Framework presented in this study.

THE DEVELOPMENT OF THE CONCEPTUAL FRAMEWORK

The findings from the thematic and framework analysis informed the conceptual framework development for this study. It links internal governance systems, collaborative governance arrangements and contextual political-institutional conditions to sustainable infrastructure outcomes. It provides an analytical framework for understanding how governance failures and capacity constraints interact, and how integrated reforms can support equitable, efficient, and resilient infrastructure delivery.

The framework was developed iteratively and draws on:

- Governance theory
- Institutional capacity literature
- Comparative international practices

Sustainable Infrastructure Governance Framework

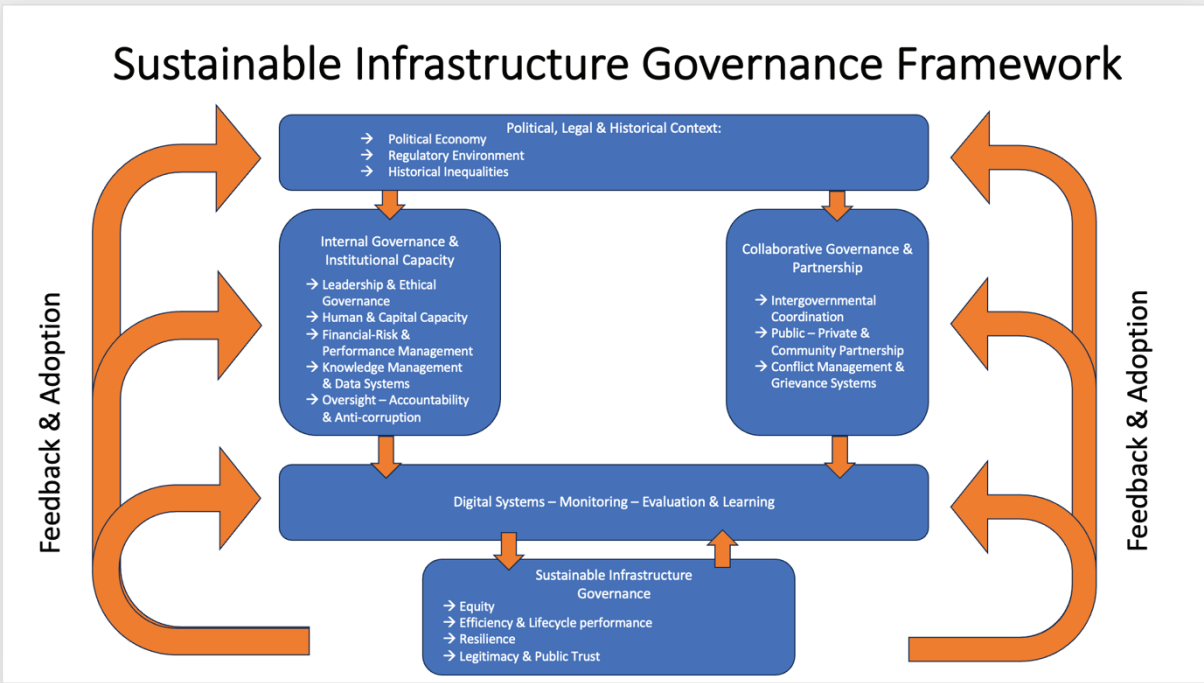

Figure 1: Sustainable Infrastructure Governance Framework

Source: Authors own (2026)

Institutional Capacity Domains in Infrastructure Governance – Internal Governance and Institutional Capacity

Leadership and Ethical Governance:

Institutional excellence is based on the integration of strategic vision, ethical foundations, and rigorous decision-making capacity, which together create complementary leadership competencies.

Dimensions such as strategic vision, ethical leadership, and decision-making capacity foster a resilient organisation, build stakeholder legitimacy, and sustain institutional performance that is critical within the public sector, where effectiveness depends on governance legitimacy and demonstrated ethical conduct and transparent decision-making aligned with the public interest. A strategic visionary leader is someone who has a clear vision for how to direct their organisation during turbulent times and navigate uncertainties, whilst maintaining the organisation's long-term objectives. They are considered effective based on how their communication organisation's vision compels and aligns with stakeholder interests, and how organisational resources are allocated and guided toward the organisation's priorities. Research demonstrates that both transformational and ethical leadership styles effectively enhance institutional performance, with evidence of increased employees' moral behaviour and the organisation's commitment.

There is consistency between what they communicate and their actions, enabling them to create a culture of trust and accountability that spreads throughout the organisation and improves its performance. They view ethics as a guiding value integrated into decisions, not as a trade-off. Good institutional performance requires leaders who are capable of developing adaptive decision-making frameworks that combine analytical rigour with inclusive deliberation. There are four identified ethical decision-making themes under ethical leadership: recognising moral issues, conducting Analysis, forming moral intentions, and taking ethical actions. It is the leader's responsibility to balance competing shareholder interests while maintaining institutional integrity.

Human Capital Capacity:

Research across South African municipalities shows a critical deficit in technical competency. Country municipalities lack the necessary in-house skills and capacity, resulting in contracted services spending often exceeding norms due to the absence of in-house technical expertise. There are five mutually reinforcing capacity deficits identified as key dimensions affecting infrastructure development in the country, namely:

- A technical expertise gap exists when municipalities lack in-house technical skills, forcing them to rely on expensive external consultants who lack accountability for long-term outcomes. This undermines the design quality and lifecycle oversight from inception.
- Financial management is deficient due to insufficient knowledge, resulting in weak financial capacity. This results in under-expenditure on maintenance, cost under-recovery, and tariff dysfunction, which accelerate the deterioration of infrastructure across all assets (Wall, 2024).
- Institutional coordination failures arise from siloed departments, fragmented governance, and political interference in personnel appointments, which override merit-based decision-making (Robert, 2022).
- Data gaps due to the absence of robust monitoring systems and data-sharing mechanisms. Municipalities are unable to track their performance, identify problems early or enable adaptive management. This information vacuum prevents accountability and learning (Marindi & Pillay, 2025; Mello, 2018).

These dimensions cascade into weak leadership, which creates silos and prevents coordination, thereby worsening financial mismanagement. The financial deficits eliminate maintenance budgets because there are no monitoring systems to track performance. A systemic solution is required to restore infrastructure, as demand calls for simultaneous intervention across all dimensions. There is a need to professionalise the workforce, strengthen financial systems, break institutional silos, implement lifecycle management frameworks, and establish integrated monitoring systems.

Financial – Risk and Performance Management:

Within the internal governance and institutional capacity block, financial risk and performance management ensure that infrastructure plans are fiscally sustainable, resilient to shocks, and translated into reliable service-delivery outcomes.

Financial risk management enables public institutions to identify and mitigate risks such as cost overruns, unfunded maintenance, procurement inefficiencies and fiscal exposure arising from poorly structured partnerships. Weak management is a core capacity deficit, as municipalities underspend on maintenance, misprice tariffs, and accumulate arrears, accelerating asset deterioration and service failures. Fragmented funding streams, siloed budgeting and poor lifecycle planning further undermine infrastructure performance. All these highlight weak financial controls, poor asset management and limited planning as systematic contributors to infrastructure deterioration and service delivery failures (Auditor-General South Africa, 2022). Without integrating financial risk assessment into medium-term planning and infrastructure prioritisation, governance remains reactive and politically driven, favouring new capital projects over asset preservation.

Financial risk management requires a structured cycle of identifying fiscal exposures, such as revenue volatility, cost overruns, corruption, debt, and contingent liabilities. It also requires continuous analysis of causes and likelihoods, prioritising risks, designing and implementing responses such as controls, insurance, contract and restructuring designs, and examining other critical success factors, including clear risk-governance structures, a culture of risk avoidance, adequate resources, skills, and integrated risk-information systems.

Within a sustainable infrastructure governance framework, financial risk and performance management operate to reinforce governance mechanisms. It safeguards sustainability, while performance management offers evidence for adaptive decision-making and accountability. Integrated through centralised management systems and shared data platforms, these mechanisms address fragmentation, enhance intergovernmental coordination, and decrease exposure to political interference (National Treasury, 2019).

Embedding financial risk and performance management within institutional capacity building shifts infrastructure governance from compliance-focused delivery to adaptive stewardship of public assets. This strengthens accountability, supports collaborative governance arrangements, and enhances the state's ability to deliver resilient and equitable infrastructure outcomes.

Knowledge Management and Data:

Data-driven governance is fundamental to institutional performance. Evidence indicates that integrated data information platforms facilitate evidence-based decision-making, transparent accountability, and adaptive management. However, Africa's public sector remains fragmented, hindering these countries' municipalities from facing three identified fragmented data architectures related to data challenges:

- System fragmentation: Due to departmental isolation, cross-sectoral information sharing and coordinated decision-making are non-existent. This results in weak monitoring and evaluation, as evidence is rarely translated into planning and budgeting actions. Additionally, there is an institutional capacity deficit stemming from limited analytical capacity and governance frameworks that prevent effective data utilisation, even when data systems are in place.
- System consequences: A fragmented data architecture perpetuates infrastructure failures. Weak monitoring systems fail to identify problems early, leading to infrastructure failure, and the absence of a performance baseline turns off adaptive management. Decentralised planning hinders collaboration and information flow, resulting in a lack of transparency that undermines accountability and public trust.

The failure of Africa's infrastructure stems from institutional fragmentation and a lack of cohesive coordination across national, provincial, and municipal levels. The absence of integrated monitoring and evaluation systems, coupled with unclear roles and siloed responsibilities, systematically hinders and undermines the integrated planning, delivery, and maintenance of the country's infrastructure. Each level operates within an isolated mandate rather than within coordinated frameworks. Local municipalities possess executive and legislative authority, which limits municipalities' ability to hold them accountable for failing to fulfil their constitutional obligations.

This is perplexing because the Municipal Structures Act of 1998 requires district municipalities to coordinate with and support their local counterparts (Local Government: Municipal Structures Act, 1998).

Additionally, regulatory confusion, characterised by policy overlap and inconsistent interpretation and enforcement of laws, undermines cohesion and slows service delivery. This results in a breakdown of coordinated planning, with departments working in silos, poor communication, absent data sharing, and departmental mandates prioritised over collaborative efforts toward integrated solutions. It also impedes effective monitoring of infrastructure performance, the adoption of adaptive management, and accountability across government departments. Compounding factors such as political interference through cadre deployment and political patronage override merit-based intergovernmental coordination, disrupting technical collaborations and institutional learning. Political interests take precedence over coordinated planning, particularly concerning maintenance versus new capital projects.

Successful integration and coordination require legislative clarity, focusing on role delineation and accountability across all levels of government; institutionalised, coordinated mechanisms such as binding intergovernmental forums and data protocols; and strengthening internal governance to enable reliable cross-level partnerships and multi-stakeholder commitments to collaboration rather than hierarchical governance. Most importantly, the ambiguity identified as the cause of infrastructure fragmentation needs to be addressed through institutional reforms (clear mandates, coordinated forums) and a political commitment to collaborative governance that transcends departmental and hierarchical silos.

Oversight – Accountability and Anti-Corruption:

Effective oversight strengthens institutional capacity, as research shows that strong central oversight directly correlates with institutional performance through enhanced leadership, oversight, and guidance. When oversight bodies lack hierarchical authority or adequate resources, civil servants comply with institutional requirements only formally, reducing governance effectiveness.

South Africa has a comprehensive anti-corruption architecture, including constitutional protections, financial management acts, and anti-corruption legislation. Yet, there is still institutional resilience and collapse due to the consistent non-application of the laws, not from the absence of policy, revealing a governance gap. When anti-corruption laws are not properly applied and accountability is lacking, this leads to maladministration, creating a permissive environment for recidivism. Public institutions that lack accountability mechanisms are unable to detect, deter, and prevent misconduct. Legitimacy is eroded, enabling systematic malfeasance.

There is deliberate institutional dismantling when political interference operates systematically through cadre deployment, organisational restructuring, and staff purging to dismantle institutional capacity. An example of this is when South African Revenue Services (SARS) was captured by the elite, resulting in a loss of human capacity to detect and investigate crimes and the collapse of information technology systems that support the institution's function of SARS's destruction was a political act, not a resource-scarcity issue (Ismail & Richards, 2023).

Oversight deficit drives systematic failures by enabling corruption in procurement, financial management, and service delivery. This failure stems from three identified procurement problems: inadequate official capacity, non-compliance with legal requirements, and political interference that overrides competitive processes. Without an independent oversight authority, technical capacity alone cannot prevent corruption.

Institutional resilience requires integrated governance, demonstrated by a transparent oversight structure, reduced opportunities for corruption, independent bodies with hierarchical authority, consistent consequences to deter misconduct, performance monitoring, and institutional autonomy that protects technical capacity from political capture. Institutional resilience depends largely on governance architecture that enables ethical practices. Governance frameworks prove ineffective when oversight mechanisms lack authority, accountability systems lack enforcement, and political interference systematically dismantles capacity. Oversight, ethics, and accountability can function as integrated determinants of institutional capacity only when legal frameworks are implemented and applied appropriately.

Institutional Capacity Building and Collaborative Governance – Collaborative Governance and Partnerships

Institutional and Intergovernmental Coordination:

Africa's infrastructure failure is due to institutional fractures and fragmented coordination across national, provincial, and municipal levels. The absence of an integrated monitoring and evaluation system, along with unclear roles and siloed responsibilities, prevents and undermines the country's thematic, integrated planning, delivery, and maintenance of infrastructure, as each level operates under an isolated mandate rather than within coordinated frameworks. Local municipalities possess executive and legislative authority, which limits their ability to hold themselves accountable for failing to fulfil their constitutional obligations. This is ambiguous because the Municipal Structures Act, 1998, requires district municipalities to coordinate with and support their local municipalities.

There is also the issue of regulatory confusion, in which policy overlap and inconsistent interpretation and enforcement of law undermine cohesion and slow service delivery. This leads to a breakdown in coordinated planning, with departments working in silos, poor communication, no data sharing, and prioritising departmental mandates over collaboratively working towards integrated solutions. It also hinders effective monitoring of infrastructure performance, the adoption of adaptive management, and accountability across government departments. Compounding factors, such as political interference through cadre deployment and political patronage, override merit-based intergovernmental coordination, disrupting technical collaborations and institutional learning. Political interests supersede coordinated planning, particularly regarding maintenance versus new capital projects. A successful integration and coordination requires legislative clarity, with a focus on role delineation and accountability across all levels of government; institutionalised, coordinated mechanisms such as binding intergovernmental forums and data protocols; strengthened internal governance to enable reliable cross-level partnerships; and multi-stakeholder commitments to collaborate rather than hierarchical governance. Most importantly, the ambiguity identified as the cause of infrastructure fragmentation needs to be addressed through institutional reforms (clear mandates and coordinated forums) and a political commitment to collaborative governance that transcends departmental and hierarchical silos.

Public-Private-Community Partnerships and Institutional Capacity Building:

Public–Private–Community Partnerships (PPCPs) are crucial in collaborative governance and partnership for the sustainable development of public infrastructure in South Africa because they explicitly acknowledge communities as stakeholders in infrastructure planning, delivery, and oversight, aligning closely with the collaborative governance theory outlined in this study's framework (Kader & Fahri, 2025). In contexts marked by inequality, contested service delivery, and low institutional trust, these partnerships rely not only on financial or technical expertise but also on the state's institutional capacity to manage complex relationships. They serve as a means for institutional capacity building by integrating state authority, private technical and financial resources, and local knowledge into structured, rule-bound arrangements. Institutional capacity building is essential for effective PPCPs.

The literature indicates that partnerships often fail when public institutions lack the internal governance capacity to prepare projects, manage contracts, coordinate across government levels, and maintain accountability. Weak project preparation, unclear role allocation, and limited contract management capabilities expose infrastructure programs to fiscal risk, underperformance, and social contestation (National Treasury, 2019; Auditor-General South Africa, 2022). Consequently, partnerships become unstable or shift risk back onto the public sector. Under a sustainable infrastructure governance framework, PPCPs are supported by institutional capacities in four key areas.

- Strategic planning, financial management, and risk management are essential, with the National Treasury's Payment System requiring rigorous project appraisal, risk allocation, lifecycle costing, and performance-based contracts. These measures strengthen internal decision-making, financial discipline, and risk management within departments and municipalities, enabling institutions to assess affordability, manage fiscal commitments, and align infrastructure investments with long-term lifecycle costs.
- Intergovernmental coordination capacity is vital where national, provincial, and municipal mandates intersect, as fragmented authority remains a persistent cause of delivery failure.

This capacity allows PPPs to transfer significant technical, operational, and financial risk to private partners while compelling public entities to develop contract management, monitoring, and enforcement skills. It also facilitates long-term contracts that foster learning within treasury, line departments, and municipalities, as well as stakeholder management and dispute avoidance. Community partnership capacity is the third key area, involving structured, early stakeholder engagement; clear role definition; transparent communication; and formal mechanisms to resolve legal and regulatory disputes, thereby directly enhancing governance, accountability, and conflict management capabilities. Within this capacity, grievance mechanisms provide social legitimacy and reduce conflict-related disruptions.

- The fourth key area is data, monitoring, and accountability, where PPP guidance emphasises measurable outputs, monitoring indicators, and public reporting on socio-economic impacts and B-BBEE, institutionalising performance information and external scrutiny.

In South Africa, the immediate practices identified under PPCP initiatives include the Mega Water Infrastructure project, which includes the Olifants Management Model, and the planned Vaal-Gamagara upgrade, both of which receive co-funding from DWS and mining companies. This initiative ensures water distribution to 94 villages and involves commitments to joint governance and implementation through the Lebalo Water Users Association and the Water Partnership Office (DWS–DBSA–SALGA). In municipal services, MISA encourages PPPs and innovative financing to support unfunded municipal infrastructure, operations, and maintenance, explicitly linking these partnerships to SME development and job creation. KwaDukuza's waste-management PPP underscores the importance of robust oversight, performance monitoring, and community engagement as keys to success.

Empirical research on hybrid governance in South African PPPs indicates that public value relies less on formal PPP structures and more on frameworks that operationalise role clarity, inclusive participation, a balance of trust and accountability, and equitable outcomes. PPCPs are implemented as capacity-building governance systems and through digital monitoring, evaluation, and learning platforms, which integrate financial, performance, and social data across partners and institutions. These systems promote transparency, enable early risk detection, and facilitate adaptive decision-making. Without such institutionalised systems, partnerships depend on informal coordination and reactive problem-solving, which under Sustainability. In this context, PPCPs are not replacements for institutional capacity but rather tests of it. Where internal governance and institutional capacity are weak, partnerships exacerbate governance failures. Conversely, where capacity is strong, PPCPs serve as tools for collective problem-solving, resilience, and equitable infrastructure outcomes, reinforcing the aims of sustainable infrastructure governance in South Africa.

Conflict Management and Grievance Systems within Collaborative Governance and Partnerships:

Within collaborative governance & partnership, grievance systems function as relational governance tools rather than standalone complaint mechanisms. Instruments like Social Impact Assessment (SIA) and Social Impact Management Plans (SIMPs) are essential management tools that translate predictive assessments into defined responsibilities, resources, and procedures for mitigation, monitoring, reporting, and handling complaints and grievances throughout the project lifecycle. They facilitate intergovernmental coordination by delineating responsibility for social impacts across institutional boundaries and enhance public–private and community partnerships by offering predictable channels for dispute resolution and remedy. In doing so, they lower transaction costs, manage social risk, and ensure continuity in infrastructure delivery. However, SIAs are often perceived as mere permitting hurdles rather than ongoing governance tools, especially where public participation is weak, disadvantaged communities are underrepresented, and SIA specialists frequently conduct SIA components. This "associational mentality "leads to social issues and conflicts that later emerge as protests or litigation rather than being addressed through structured mechanisms. Effective grievance systems also serve as accountability mechanisms by offering transparent, accessible, and time-bound processes for lodging and resolving complaints. They bolster trust and legitimacy in governance arrangements, but when grievances are ignored or informally managed, collaborative governance becomes merely symbolic, reinforcing power imbalances and undermining partnership credibility.

In this framework, conflict management and grievance systems are directly connected to Digital Systems, Monitoring, Evaluation & Learning, which operationalise feedback loops. Integrating grievance data into digital monitoring platforms enables institutions to identify systemic issues, track recurring conflicts, and incorporate social intelligence into decision-making.

The approach also transforms conflict from a reputational threat into a governance tool that supports institutional learning and adaptive management. Building institutional capacity, therefore, necessitates clear legal mandates for grievance systems linked to infrastructure and EIA/EMPr/SIA processes. Institutionalising these mechanisms enables infrastructure governance to move beyond procedural consultation toward sustained, accountable, and adaptive engagement within complex political, legal, and historical contexts.

This is because officials are trained in conflict management and mediation; integrated data systems enable grievance trends to inform risk registers and performance indicators; and oversight by independent bodies enforces accountability and ethical standards. Such systems close the feedback loop in the Sustainable Infrastructure Governance Framework by converting complaints into learning, design changes, and improved trust in public infrastructure delivery. So a robust collaborative governance & partnership, along with conflict management and grievance systems, directly contributes to Sustainable Infrastructure Governance outcomes, particularly in terms of legitimacy and public trust, resilience, and equity. Institutionalising these mechanisms enables infrastructure governance to move beyond procedural consultation toward sustained, accountable, and adaptive engagement within complex political, legal, and historical contexts.

DISCUSSION

The findings in this study reinforce the central argument in the literature that sustainable infrastructure governance depends primarily on the institutional capacity and governance integration rather than on policy frameworks or financial resources alone. Consistent with institutional capacity theory, the analysis indicates that infrastructure failures in South Africa are largely driven by systematic governance weaknesses, including fragmented mandates, weak oversight systems, limited technical capacity and poorly integrated monitoring and information systems. These findings support scholarship that conceptualises institutional capacity as a multidimensional construct shaped by leadership, organisational systems, accountability mechanisms, and the broader political-institutional context, rather than by technical skills alone.

The study also confirms insights from the infrastructure governance literature that emphasise the importance of lifecycle planning, intergovernmental coordination, and accountability mechanisms in maintaining infrastructure sustainability. Evidence from the analysis shows that fragmented planning systems, siloed budgeting processes and weak maintenance prioritisation contribute significantly to infrastructure deterioration. These patterns reflect broader governance challenges identified in both South African and International studies, which highlight the role of institutional fragmentation and weak coordination in undermining infrastructure performance.

A key insight emerging from the study concerns the relationship between internal institutional capacity and collaborative governance. While collaborative governance is widely promoted as a mechanism for addressing complex public-sector challenges, the findings indicate that its effectiveness depends heavily on the strength of internal governance systems. This aligns with collaborative governance theory, which emphasises that effective collaboration requires capable institutions, strong leadership and clear accountability arrangements. In contexts where internal governance capacity is weak, collaborative mechanisms risk becoming symbolic processes that do not translate into improved governance outcomes.

The analysis further highlights the influence of political-institutional dynamics on infrastructure governance. Political interference, patronage-based appointment and short-term political incentives can undermine professional decision-making and weaken institutional accountability systems. These dynamics support political economy perspectives which argue that institutional performance is shaped not only by formal governance structures but also by underlying power relations and incentive systems.

Integrating these insights, the study advances a more comprehensive understanding of sustainable infrastructure governance. The findings demonstrate that institutional capacity building, collaborative governance and infrastructure governance should not be treated as separate policy domains but as interconnected components of a broader governance system. The conceptual framework proposed in this study reflects this integration by linking internal governance systems, collaborative governance mechanisms and political-institutional context to infrastructure outcomes. In doing so, the framework provides a structured analytical lens for understanding persistent infrastructure governance failures and offers a foundation for future empirical research and policy reform.

CONCLUSION

This study explored institutional capacity building as a key factor in sustainable infrastructure governance in South Africa by synthesising secondary literature, policy documents, and institutional reports. Analysis reveals that ongoing infrastructure failures are not mainly due to policy gaps or resource limitations but stem from systemic institutional weaknesses rooted in governance architecture, organisational design, and political–institutional dynamics. The findings show that institutional capacity deficits are multidimensional and mutually reinforcing. Weak leadership, fragmented mandates, politicised administration, inadequate financial and risk management, limited data integration, and poor performance oversight collectively hinder infrastructure planning, maintenance, and lifecycle sustainability. These structural constraints indicate that isolated technical or training interventions are insufficient for achieving lasting improvements.

The study also demonstrates that while collaborative governance is crucial for legitimacy and coordination, it cannot make up for weak internal governance systems. Partnerships and stakeholder mechanisms are effective only when institutional capacity, fiscal discipline, contract management capability, and oversight systems are already established. Thus, collaboration enhances rather than replaces strong internal governance. By integrating institutional capacity building, infrastructure governance, collaborative governance, and political economy dynamics, the proposed Sustainable Infrastructure Governance Framework provides a coherent explanation for infrastructure underperformance. It underscores the interdependence between internal governance systems, collaborative mechanisms, and contextual conditions, emphasising governance alignment as central to achieving equitable, efficient, and resilient infrastructure outcomes. Although the framework has not been empirically tested, it offers a structured foundation for future sector-specific and municipal research. More broadly, the study highlights that sustainable infrastructure reform requires integrated institutional strengthening, the professionalisation of technical functions, lifecycle-based financial management, and enhanced oversight to support adaptive and accountable governance.

RECOMMENDATIONS

The implications of this study go beyond national governance reform and are directly relevant to the strategic role of Development Finance Institutions (DFIs). DFIs play a crucial role in strengthening infrastructure systems by not only financing projects but also supporting institutional capacity, governance reform, and coordinated infrastructure planning. The findings suggest that sustainable infrastructure outcomes depend on aligning financial investment with robust governance systems, professionalised technical capacity, and integrated monitoring frameworks. In this context, DFIs can contribute by supporting institutional strengthening initiatives, promoting lifecycle-based infrastructure planning, facilitating public-private-community partnerships, and encouraging the adoption of integrated governance and data systems across infrastructure sectors. By aligning financing strategies with institutional capacity development and governance reform, DFIs can enhance the long-term sustainability, accountability, and development impact of infrastructure investment.

In line with the DFIs mission to enhance public-sector capability and infrastructure delivery, the following strategic actions are proposed:

- Strengthen institutional architecture and intergovernmental coordination by clarifying mandates across different government levels and institutionalise structured coordination platforms that connect planning, budgeting, implementation, and maintenance. Infrastructure governance should be managed as a lifecycle system rather than as project-based expenditure.
- Professionalise leadership and technical capacity by implementing competency-based appointments for senior infrastructure roles and shielding technical functions from political interference. Develop internal engineering, financial, and contract management capacity to reduce reliance on consultants and enhance project execution.
- Embed financial sustainability and lifecycle risk management. Incorporate lifecycle costing, maintenance prioritisation, and structured financial risk assessment into medium-term budgeting frameworks. Also, enhance performance oversight mechanisms to ensure fiscal discipline and asset preservation.

- Invest in integrated digital monitoring and performance systems by creating interoperable data platforms that link infrastructure planning, financial management, risk registers, and monitoring systems. This will support evidence-based decision-making and early risk detection, both crucial for adaptive governance.
- Align collaborative partnerships with institutional readiness because public–private–community partnerships should be preceded by governance and capacity assessments. Collaboration must reinforce internal accountability systems and fiscal oversight, rather than substitute for weak institutional capacity.
- Address political–institutional constraints. Sustainable reform requires safeguarding administrative autonomy, strengthening oversight mechanisms, and limiting short-term political prioritisation of capital expansion over maintenance.

Collectively, these recommendations support a shift toward integrated, fiscally resilient, and institutionally robust infrastructure governance systems that deliver equitable and sustainable development outcomes.

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