

Innovation Ecosystems and Collaborative Governance in Digital Public Service Delivery: A Framework for Post-Fuel Subsidy Removal Nigeria

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Abstract

The withdrawal of Nigeria's petroleum subsidy regime in 2023 precipitated a fiscal shock that has reshaped the operating environment of public institutions, intensifying pressure on government agencies to deliver services more efficiently with fewer resources. In response, a growing number of federal and sub-national institutions have turned to digital innovation, including mobile governance platforms, artificial-intelligence-enabled service portals, blockchain-based procurement systems, and data analytics for palliative distribution, as a route to cost containment, expanded service reach, and greater transparency. Yet the success of these initiatives is rarely determined by technology alone; it is mediated by the innovation ecosystems and collaborative governance arrangements within which public institutions, private technology firms, civil society organisations, development partners, and academic actors interact. This paper develops a conceptual and methodological framework for examining how such ecosystems form, function, and generate administrative and social outcomes under conditions of fiscal austerity. Drawing on Innovation Ecosystem Theory, Collaborative Governance Theory, the Socio-Technical Systems Approach, and an Institutional Logics perspective, the paper proposes an integrated model linking ecosystem actors, governance mechanisms, innovation outputs, and outcomes of administrative efficiency, citizen trust, and inclusion. A mixed-methods, sequential explanatory design, combining a multi-state comparative survey with qualitative case studies, document analysis, and social network analysis, is proposed as the empirical vehicle for testing the framework. The paper concludes by outlining the theoretical, empirical, methodological, and policy contributions anticipated from this line of inquiry, positioning the study as a foundation for strengthening collaborative digital governance in resource-constrained developing-country contexts.

Keywords: citizen trust, collaborative governance, digital public service delivery, fiscal austerity, innovation ecosystems, institutional logics, Nigeria

1. Introduction

Nigeria's decision to remove long-standing petroleum subsidies in May 2023 marked one of the most consequential fiscal policy shifts in the country's recent history. The removal, intended to free up resources for development spending and correct decades of market distortion, triggered an immediate and sustained rise

in transportation and energy costs, a corresponding surge in headline inflation, and a marked contraction in households' real purchasing power (Evans et al., 2023; Ozili & Obiora, 2023). For public institutions, the shock has been twofold: government revenue positions have, in principle, improved as subsidy-related expenditure has fallen, while the cost of running public institutions—fuelling vehicles, powering offices, procuring goods and services—has risen sharply, even as citizens' expectations for responsive, affordable, and equitable public services have intensified.

Against this backdrop, digital innovation has emerged as a central strategy through which government institutions attempt to reconcile fiscal constraint with service continuity. Mobile applications now mediate access to social registers and palliative programmes; artificial-intelligence-enabled portals triage citizen enquiries in place of expanded human case-loads; blockchain-based platforms are piloted to improve the integrity of public procurement; and data analytics tools are deployed to target subsidy-relief interventions to the households presumed most in need. These initiatives are frequently framed, by government communiqués and development-partner reports alike, as evidence of a modernising, efficiency-seeking state—a framing consistent with global GovTech evidence suggesting that digitally enabled public service reforms across Africa can unlock several trillion dollars in aggregate efficiency, transparency, and sustainability value where cross-sector coordination and interoperability are achieved (World Economic Forum, 2025).

Nigeria's digital-government trajectory prior to 2023 was shaped by successive e-government strategies and state-level GovTech initiatives oriented mainly toward efficiency gains in revenue collection and identity management, exemplified by the Treasury Single Account and the National Identification Number scheme. The subsidy removal has since redirected attention toward digital tools for social protection and palliative targeting, reflecting an urgent political need to demonstrate that the savings from subsidy withdrawal are being channelled to affected citizens. This shift has occurred rapidly and, in many documented cases, without the institutional groundwork—interoperable data systems, agreed data-governance protocols, tested vendor-management frameworks—that more deliberate digital transformation processes would ordinarily require.

Digital initiatives of this kind rarely originate, or succeed, within the boundaries of a single government agency, however. They are typically produced and sustained through an innovation ecosystem: a configuration of public bureaucracies, private technology vendors, civil society organisations, multilateral and bilateral development partners, and academic or research institutions, each contributing distinct resources, incentives, and forms of legitimacy. Despite the proliferation of such initiatives since 2023, there remains limited empirical understanding of how these ecosystems are structured, what governance mechanisms hold them together, and how they actually affect administrative efficiency, service delivery, and citizen trust—leaving policymakers to rely on anecdote and vendor claims rather than evidence. A recent bibliometric analysis of 128 Scopus-indexed studies on ICT in Nigerian public administration published between 1993 and 2025 lends weight to this observation: it finds that the existing literature clusters heavily around adoption factors, implementation challenges, and success factors for individual e-government projects, with comparatively little attention paid to the multi-actor arrangements through which such projects are actually produced and sustained (Ishola, Maramura, & Gumbo, 2025). The risks of proceeding without that understanding are not merely theoretical: an analysis of the distribution of Nigeria's COVID-19 palliatives found that weak oversight and unclear accountability lines in emergency distribution channels created substantial opportunities for corruption, a precedent that raises the stakes for the largely untested digital palliative-distribution channels introduced after the 2023 subsidy removal (Olujobi & Yebisi, 2024).

To address that gap, this paper aims to map the key actors and institutional arrangements within digital innovation ecosystems in Nigerian public-sector domains, analyse the formal and informal governance mechanisms that facilitate or hinder collaboration among public, private, and civil society actors, assess the

anticipated effects of these ecosystems on administrative efficiency and citizen trust, and develop a context-specific framework for collaborative governance of innovation ecosystems in resource-constrained developing countries. In doing so, the study extends innovation-ecosystem and collaborative-governance theorising into an African, crisis-affected setting underrepresented in a literature still dominated by cases from high-income, fiscally stable economies, and it foregrounds citizen trust as an outcome variable in its own right rather than a by-product of administrative efficiency.

2. Literature Review

2.1 Theoretical Review

This study draws on four complementary theoretical traditions. Innovation Ecosystem Theory conceives of innovation as the product of interdependent actors whose combined contributions are necessary for a focal value proposition to reach end users, with ecosystem success resting on the alignment of actors' activities, positions, and expectations of value. Collaborative Governance Theory identifies the conditions—face-to-face dialogue, trust-building, commitment to process, and shared understanding—that enable multi-actor arrangements to move from consultation toward genuine joint production of public value. The Socio-Technical Systems Approach resists purely technical accounts of digital transformation, insisting that technology, organisational routines, and human actors co-evolve and must be analysed together. An Institutional Logics perspective is used to analyse the tensions that arise when actors operating under different organising principles—bureaucratic logics emphasising procedural regularity, market logics emphasising efficiency and return, and network logics emphasising reciprocity—are brought together within a single ecosystem. Recent empirical work on public-private hybrid organisations supports the expectation that such tensions do not resolve into a single stable pattern: in a multiple case study of five city hospitals operating under public-private partnership arrangements, Danisman and Özseven (2025) find that state and market logics combined in three distinct configurations—compatible, complementary, and contradictory—depending on how actors negotiated their day-to-day interactions, with each configuration producing a different pattern of tension resolution. This suggests that institutional-logic conflict in Nigeria's digital ecosystems is unlikely to take a single form across states or initiatives, a possibility the multi-state design in Section 3 is intended to capture rather than assume away.

The amalgamation of these frameworks mitigates the shortcomings associated with single-theory approaches. While Innovation Ecosystem Theory and Collaborative Governance Theory clarify who the relevant actors are and how they might cooperate, the Socio-Technical Systems Approach and Institutional Logics perspective explain why cooperation often falls short in practice. This synthesis creates an integrated lens through which the structure, governance, and outcomes of Nigeria's post-subsidy digital public service ecosystems can be examined as a coherent whole rather than as isolated technical projects.

2.2 Innovation Ecosystems and Digital Public Service Delivery

The innovation ecosystem concept, developed principally in the private-sector strategy literature, has increasingly been applied to public administration to capture the reality that public digital initiatives seldom originate from a single organisation acting alone. An ecosystem perspective directs attention to the interdependence of actors: a government agency's digital service typically depends on private software vendors for platform development, telecommunications firms for connectivity, civil society organisations for community-level trust-building and feedback, and development partners for financing and technical assistance. Public-sector applications of the concept have highlighted that ecosystem health depends not merely on the presence of capable actors but on the alignment of their incentives and the clarity of the value each expects to derive from participation—conditions that are harder to sustain when public budgets are

volatile.

Recent subnational evidence lends empirical weight to this ecosystem-alignment logic. Drawing on a fourteen-year panel of Chinese provinces, Pu, Ou, and Bai (2025) find that government-delivered public services have a significantly stronger positive effect on regional digital transformation when complemented by market development, higher-education institutions, and social entrepreneurship, rather than when government acts in isolation, illustrating that ecosystem completeness, not government effort alone, drives digital-transformation outcomes. Whether the same pattern holds in a fiscally constrained federal system such as Nigeria's, where the relevant complements (market development, higher-education capacity, social entrepreneurship) are themselves unevenly distributed across states, remains an open empirical question that the present framework is designed to address.

A related, and largely separate, literature on collaborative governance networks in the public sector offers more direct evidence on the consequences of ecosystem structure itself. Scott and Thomas (2017), testing hypotheses on how an actor's position within a policy network shapes its access to resources within collaborative governance regimes, find that actors occupying brokerage or central positions do not automatically translate that position into greater resource access, a finding that complicates any assumption that hub actors straightforwardly benefit at the expense of peripheral ones. Yi (2018), working with a large sample of self-organising governance networks in the United States, finds that network structures characterised by high bridging and bonding social capital are associated with statistically significant improvements in governance performance, suggesting that networks combining strong internal cohesion with external connectivity outperform more fragmented or narrowly centralised ones. Read together, this body of work supports the general expectation that ecosystem structure matters for outcomes, while cautioning against a simple story in which centrality alone determines advantage; the specific consequences of a hub-and-spoke configuration for service continuity in the Nigerian case, rather than being read off from structure alone, are precisely what the empirical work proposed in Section 3 is designed to establish.

Proposition 1 (P1): Digital innovation ecosystems in post-subsidy Nigeria are expected to display a hub-and-spoke rather than a distributed network structure, with a small number of well-resourced technology vendors and donor-funded programme units occupying central positions while civil society organisations and citizen-facing intermediaries occupy more peripheral roles, concentrating ecosystem resilience in a small number of actors whose withdrawal could disproportionately disrupt service continuity.

2.3 Collaborative Governance and Multi-Actor Partnerships

A parallel literature on collaborative governance examines the conditions under which public, private, and civil society actors jointly produce policy or service outcomes that none could achieve alone. This literature emphasises face-to-face dialogue, trust-building, and shared ownership of process as preconditions for productive collaboration, while cautioning that power asymmetries among participants—for instance between a resource-constrained ministry and a well-capitalised technology vendor—can distort collaborative processes toward the interests of the more powerful actor. In fiscally stressed environments, such asymmetries may be magnified: government agencies with diminished discretionary budgets may become more dependent on vendor or donor financing, with implications for their bargaining position within the ecosystem. A recent qualitative comparative analysis of digital government partnerships across Chinese provinces reinforces this configurational view, showing that state, market, and corporation logics combine in varying combinations to produce high digital-government performance, such that no single governance arrangement is universally optimal (Gong & Yang, 2024).

Civil society's position in this configuration is not necessarily as marginal as a purely resource-based account would suggest. A recent study of Cape Town's public safety ecosystem found that grassroots civil society actors—community organisations, neighbourhood watches, and residents—drove a substantial digital shift by adopting low-barrier technologies such as collaborative messaging apps and shared camera-control rooms, achieving levels of coordination and information-sharing that better-resourced formal actors had not organised on their own (Mangai, Wilhelm, & Ayodele, 2026). This is a single South African city case and does not establish that Nigerian civil society actors have comparable capacity or opportunity, but it does indicate that peripheral position in a hub-and-spoke structure need not translate into peripheral influence, provided civil society actors have access to accessible digital tools, a possibility the fieldwork proposed in Section 3 will need to test directly for Nigeria's post-subsidy ecosystems rather than assume in either direction.

The broader aid-effectiveness literature offers a cautionary complement to this configurational view, even though it was not developed with digital initiatives in mind. Brautigam and Knack (2004), examining a cross-section of Sub-Saharan African countries, find that sustained high levels of aid are associated with a deterioration rather than an improvement in the quality of domestic governance institutions, an effect they attribute partly to the parallel administrative structures, reporting requirements, and coordination burdens that heavy aid dependence imposes on recipient bureaucracies. This finding does not speak directly to digital-sector partnerships, and the mechanism it identifies—aid volume weakening institutions over time—is broader than the narrower question of which governance instruments donor-funded projects adopt. It is nonetheless relevant here: if donor engagement carries this kind of institutional cost even as it brings the formal governance instruments described above, the practical implication for Nigeria's post-subsidy ecosystems is that formalisation and institutional strengthening cannot simply be assumed to move together, a tension the proposed fieldwork is positioned to examine directly rather than resolve in advance.

Proposition 2 (P2): Formal governance instruments such as memoranda of understanding and steering committees are expected to be more prevalent in donor-funded digital initiatives than in domestically financed ones, while informal, personalised coordination is expected to play a proportionally larger role in initiatives sustained primarily through domestic government budgets under fiscal stress, highlighting a governance gap in precisely those initiatives most exposed to the volatility introduced by subsidy removal.

2.4 Fiscal Austerity, Socio-Technical Dynamics, and Institutional Logics

A smaller body of work considers how fiscal austerity shapes public-sector digitalisation. Two competing propositions emerge in this literature: the first holds that austerity accelerates digital adoption by increasing the marginal value of automation and self-service channels relative to costly in-person service delivery; the second holds that austerity undermines digital transformation by curtailing the complementary investments—staff training, system maintenance, cybersecurity, change management—without which digital platforms fail to deliver their intended efficiency gains. Consistent with the socio-technical systems literature, the introduction of digital platforms reshapes bureaucratic routines and frontline discretion, and these reconfigurations feed back into the reliability and perceived legitimacy of the platforms themselves, while institutional-logic tensions—for example between a bureaucratic actor's procurement rules and a vendor's commercial timelines—are expected to intensify under fiscal stress. A recent systematic review of digitally induced change in the public sector reaches a consistent conclusion: whether digital initiatives produce lasting administrative change depends on resource availability and complementary organisational investment, not on technology adoption in itself (Haug, Dan, & Mergel, 2024). Two recent single-country studies from fiscally stressed European welfare states illustrate how mixed the empirical picture actually is. Loukis and Kavallari (2025), studying public social security and health organisations in Greece across the 2010 to 2018 economic

crisis, find that both ICT-related investment and operating expenditure fell sharply during the crisis period, yet, counterintuitively, digital transformation activity in these organisations increased rather than stalled, an outcome the authors themselves describe as unexpected. Collington (2022), examining Danish public sector digitalisation reforms between 2002 and 2019, finds a less encouraging pattern: digitalisation pursued partly as a route to fiscal stability led, paradoxically, to a retrenchment of in-house public sector capacity as critical digital infrastructure was transferred to private technology firms. Read together, the two studies caution against assuming either proposition above holds uniformly: austerity can coincide with continued or even accelerated digital activity even as it erodes the in-house capacity to sustain that activity independently. Both studies are drawn from high-income European contexts with administrative and fiscal starting points very different from Nigeria's, so their findings should be read as evidence that the mechanism proposed in P3 is plausible and has been documented elsewhere, not as a demonstration that it will operate identically in a Nigerian federal, post-subsidy setting.

This expectation extends to citizen trust. A systematic review of e-government and public trust across developing countries finds that digital platforms build trust chiefly by improving perceived service delivery, transparency, and citizen participation, with effects that are conditional on institutional reliability and technological confidence rather than guaranteed by digitalisation itself (Nyadzi & Morris, 2025). Nigeria-specific survey evidence points in the same direction: citizens' preference for and trust in digitally mediated governance channels is shaped by the perceived responsiveness and transparency of the platforms and institutions involved, not by the mere availability of a digital channel (Oludu, Kaya, & Karagozlu, 2025). A recent qualitative study of urban and semi-urban residents across Nigeria substantiates this picture in more granular terms: drawing on interviews with 27 citizens, Egba et al. (2026) find that trust in digital public services is mediated not only by usability and efficiency but by perceptions of accountability, data surveillance, equity, and institutional intent, leading the authors to propose accessibility, accountability, transparency, equity, and engagement as the interrelated pillars shaping how citizens judge digital governance reforms. This finding reinforces the second half of P3: the technology itself is rarely what citizens are actually evaluating. Taken together, these strands of evidence—drawn largely from contexts outside Nigeria's specific post-subsidy conditions—motivate rather than settle the propositions below; part of this paper's contribution is to specify how they might be tested empirically in a setting where both strands of evidence remain thin.

Proposition 3 (P3): Measured efficiency gains from digital public service platforms are expected to depend heavily on complementary investments in staff capacity and system maintenance, such that platforms introduced without such investment will show short-term cost savings followed by service degradation as usage scales; correspondingly, citizen trust in digitally mediated public services is expected to be shaped less by the presence of the technology itself than by the perceived fairness and transparency of the underlying governance arrangements.

2.5 Conceptual Framework

Drawing from the theoretical synthesis above and the propositions articulated in Sections 2.2 to 2.4, this paper introduces an integrated conceptual model that traces a sequence from ecosystem actors, through governance mechanisms, to innovation outputs, and finally to outcomes of administrative efficiency, service delivery quality, citizen trust, and inclusion. In contrast to accounts that treat digital transformation as a purely technical undertaking, this framework clarifies the distinct structural, governance, and socio-technical processes involved, and treats fiscal austerity not as a background condition but as a moderating influence acting at every stage of the sequence, shaping which actors can afford to participate, which governance mechanisms are sustainable without dedicated budget lines, which innovation outputs can be maintained post-launch, and ultimately whether outcomes are experienced by citizens as improvements or as further

sources of friction.

Figure 1. Conceptual model of digital innovation ecosystems and collaborative governance under fiscal austerity. Fiscal austerity is modelled as a moderator acting on every stage of the actor-to-outcome sequence; institutional-logic tensions, though illustrated at the actors-to-governance transition, are expected to operate throughout the sequence.

3. Research Methods

This study proposes a mixed-methods, sequential explanatory design to empirically test the conceptual framework developed in Section 2. A quantitative survey phase will first establish the scale and distribution of ecosystem characteristics, governance practices, and outcome perceptions across cases; a qualitative phase, comprising case studies, interviews, and focus groups, will then explain and contextualise the quantitative patterns, with particular attention to mechanisms that a survey instrument alone cannot capture, such as informal negotiation and institutional-logic conflict.

A multi-state comparative approach will be adopted to capture variation across levels of government and geopolitical context. Proposed sites are Lagos, a high-capacity, revenue-rich state with an established GovTech track record; Abuja/FCT, the federal seat of government, enabling examination of national-level ecosystems; and comparator states drawn from the north-east or north-west geopolitical zone alongside a south-south state such as Rivers, to capture variation in fiscal capacity, security context, and administrative culture.

The study population comprises three strata: public officials involved in digital service initiatives, including permanent secretaries, directors of ICT/digital transformation, and desk officers; private-sector and civil society partners engaged in relevant ecosystems; and citizen-users of the digital platforms under study. A purposive sampling strategy will be used to select institutional respondents and case studies, given the specialised nature of the population, while a stratified random sampling approach will be applied to the citizen-survey component to ensure representativeness across income groups, urban/rural residence, and gender.

Data will be collected through a structured survey administered to public officials, private-sector partners, and citizen-users; in-depth, semi-structured interviews with key stakeholders including permanent secretaries, technology entrepreneurs, and civil society leaders; focus group discussions with citizen-users in each study location; document analysis of policy documents, memoranda of understanding, project reports, and platform-usage statistics; and case studies of selected digital innovations such as palliative-distribution platforms, e-procurement systems, or state-level GovTech initiatives, to anchor the cross-cutting analysis in concrete, verifiable examples.

Sample size will be determined separately for each respondent stratum. For the citizen-survey component, a minimum of 384 respondents per state (Cochran's formula, 95% confidence, 5% margin of error, assuming an unknown population proportion of 0.5) will be targeted, inflated by 20% to allow for incomplete responses, yielding a working target of approximately 460 per state. For the structural model, sample adequacy will additionally be assessed against the 10-times rule and, where feasible, an a priori power analysis for the most complex regression path in the structural model, targeting 80% power to detect a medium effect size ($f^2 = 0.15$) at $\alpha = .05$. For the institutional strata (public officials, private-sector and civil society partners), a purposive target of 15 to 20 respondents per actor category per state is proposed, informed by the population sizes established during the ecosystem-mapping phase described below.

Quantitative data will be analysed using partial least squares structural equation modelling (PLS-SEM), chosen over covariance-based SEM because the model combines a formatively specified

governance-mechanisms construct with an exploratory, prediction-oriented research objective, and because citizen-survey data from a multi-state, non-probability-inclusive design is unlikely to satisfy the multivariate normality assumptions covariance-based estimation requires. Measurement-model assessment will follow standard PLS-SEM criteria (indicator loadings, composite reliability, average variance extracted, and heterotrait-monotrait ratio for discriminant validity), and the structural model will be assessed using path coefficients, bootstrapped t-values and confidence intervals (5,000 resamples), R^2 , and, where the research question calls for out-of-sample assessment, PLSPredict. Qualitative data will be analysed using thematic analysis, supplemented by process tracing to reconstruct the sequence of decisions and events that shaped each case study's trajectory. Social network analysis will be used to map ecosystem structure formally, using relational data on communication, funding, and formal-agreement ties among actors identified during the mapping phase. Because public officials will report on both governance mechanisms and perceived efficiency outcomes within the same instrument, procedural remedies (temporal and psychological separation of predictor and outcome items, anonymity, and varied response-scale anchors) will be applied at the design stage, and a full collinearity VIF test will be used post hoc to assess the extent to which common method bias threatens the observed relationships.

The study will seek institutional ethical clearance prior to data collection, obtain informed consent from all participants, and ensure anonymisation of individual respondents in all reporting. Data from citizen-users who are current or former recipients of palliative programmes will be handled under heightened safeguards, consistent with Nigeria's Data Protection Act 2023: no data linking survey responses to palliative-registration status will be retained beyond the minimum needed for stratification, and reporting will aggregate at a level that precludes identification of individual households. As with any comparative, multi-state study, the design faces trade-offs between depth and breadth, and findings from the selected states may not generalise fully to states with markedly different fiscal capacity or administrative culture; the rapidly evolving post-subsidy policy environment further means that ecosystem arrangements documented during fieldwork may shift before publication, a limitation the study will address by clearly time-stamping its empirical claims.

4. Theoretical and Practical Implications

As a conceptual and methodological paper, this study has not yet generated empirical findings; the contributions outlined below are anticipated from the framework and propositions developed above, and are intended to guide the empirical work described in Section 3 rather than to report its outcomes.

4.1 Theoretical Implications

The framework contributes to theory in four respects. First, it extends Innovation Ecosystem Theory and Collaborative Governance Theory into a fiscally volatile, African public-administration setting, a context in which the assumptions of stable public budgets common to much of the originating literature do not hold. Second, it integrates institutional-logics analysis with ecosystem and governance perspectives, offering a more granular account of why collaboration succeeds or fails than either perspective could provide alone. Third, it treats citizen trust as a distinct outcome variable warranting independent measurement, rather than inferring trust from efficiency metrics. Fourth, methodologically, it demonstrates how social network analysis can be combined with structural equation modelling and qualitative process tracing within a single sequential explanatory design, offering a template for future public-administration research on multi-actor digital governance.

4.2 Practical and Managerial Implications

For government institutions, the framework suggests the value of formalising governance arrangements, even for domestically financed initiatives, so that coordination does not depend solely on the continuity of specific personal relationships among officials and technologists. For technology vendors, it suggests that long-term commercial viability in this sector is likely to depend on demonstrable contributions to citizen trust, not solely on technical delivery.

4.3 Policy Implications

For development partners, the framework suggests structuring support to strengthen the position of peripheral actors, particularly civil society organisations engaged in citizen feedback and accountability, rather than concentrating resources solely with technology vendors and government programme units. This is not merely a redistributive gesture: evidence from a comparable urban African setting suggests that civil society actors equipped with accessible, low-cost digital tools can generate real coordination gains rather than simply advocacy value (Mangai, Wilhelm, & Ayodele, 2026), which strengthens the practical case for investing in their digital capacity rather than treating them as a check on vendor and government power alone. For citizens and civil society, it offers a vocabulary—ecosystem structure, governance mechanism, institutional logic—with which to interrogate and advocate for improvements to the digital services on which they increasingly depend.

4.4 Directions for Future Research

Several directions for future research follow directly from this framework. The most immediate is empirical validation of Propositions 1 to 3 using primary data from the multi-state comparative design proposed in Section 3, which would allow quantification of the relative structural centrality of ecosystem actors, the prevalence of formal versus informal governance mechanisms, and the strength of the link between complementary investment, efficiency, and trust; this work should also establish whether Nigeria's post-subsidy digital ecosystems do in fact display a hub-and-spoke structure, and to what degree this concentration threatens service continuity.

Beyond initial validation, the moderating role of fiscal austerity should be examined not as a single shock but as a continuing condition, since governance gaps between donor-funded and domestically financed initiatives may narrow or widen as the post-subsidy fiscal environment evolves. Cross-state and cross-country comparison, particularly with other Sub-Saharan African economies undergoing similar fiscal adjustment, would help define the boundary conditions of the framework: the extent to which findings from Nigeria generalise to contexts with different regulatory frameworks and digital infrastructure maturity. Relatedly, future work should determine the number of case studies and states needed to generalise findings beyond the fiscal capacity and administrative culture of the states initially studied.

Finally, future research should examine possible interaction effects among ecosystem structure, governance mechanisms, and institutional-logic tensions, and whether their combination produces synergistic or offsetting effects on administrative efficiency and citizen trust that cannot be inferred from each pathway in isolation, a question this conceptual framework raises but cannot resolve without the empirical fieldwork it proposes. Given how quickly the post-subsidy policy environment continues to evolve, all such empirical claims should be clearly time-stamped at the point of data collection.

5. Conclusion and Recommendations

The removal of Nigeria's fuel subsidy has placed unprecedented pressure on public institutions to deliver services efficiently under conditions of fiscal austerity, prompting a wave of digital innovation whose success depends as much on collaborative governance as on technology itself. This paper has developed a conceptual

and methodological framework, anchored in Innovation Ecosystem Theory, Collaborative Governance Theory, the Socio-Technical Systems Approach, and an Institutional Logics perspective, for examining how multi-actor innovation ecosystems form, govern themselves, and generate administrative and social outcomes in this context. A mixed-methods, sequential explanatory design combining survey, case-study, and network-analytic methods is proposed as the vehicle for empirically testing this framework across multiple Nigerian states.

The study recommends that government institutions formalise governance arrangements even where initiatives are domestically financed, that development partners direct a greater share of support toward strengthening peripheral civil society actors rather than concentrating resources with vendors and programme units, and that future empirical work treat citizen trust as a primary outcome to be governed for, alongside administrative efficiency. The resulting evidence base is intended to inform the design of collaborative governance arrangements that are resilient to fiscal shocks, an agenda with relevance well beyond Nigeria, to other resource-constrained developing countries navigating digital transformation amid economic volatility.

How to Cite

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