THE NIGERIAN JOURNAL OF BUSINESS AND SOCIAL SCIENCES, VOLUME 13, 2026
(SPECIAL ISSUE) 2026 PP 278-292

Models for scaling civic technology across diverse West African contexts: Barriers, pathways, and an adaptive framework

Chidimma Nwonye

Abstract
Across West Africa, civic technology is often presented as a pathway to broaden citizen participation, improve public service feedback, and strengthen government accountability. However, many civic technology initiatives fail to move beyond pilot stages because scale is treated as geographic expansion rather than contextual negotiation. This paper examines the barriers and pathways that shape the scaling of civic technology across diverse West African settings. Using a structured integrative review of 36 academic, policy, and practitioner sources published between 2015 and 2026, the study analyses how infrastructure, language, civic trust, regulatory openness, institutional capacity, financing, and data governance influence the success or failure of different scaling models. The paper identifies four major pathways: replication, adaptation, partnership, and platform-based scaling. It finds that replication is viable only where contextual conditions are closely aligned, while adaptation improves usability but remains limited without institutional responsiveness. Partnership-based scaling is shown to offer the strongest democratic value because it embeds technology within local trust networks, accountability relationships, and community knowledge. Platform-based scaling can extend reach, but only when modular design is matched with local control, technical capacity, and safeguards against centralised data Power. The paper contributes the Adaptive Scaling Matrix for Civic Technology as a diagnostic framework for matching scaling pathways to contextual readiness. It argues that civic technology in West Africa scales most effectively when growth is adaptive, locally governed, and designed to protect the citizen–state feedback loops that give civic technology its democratic meaning.

Keywords: Civic technology, West Africa, democratic resilience, adaptive scaling, extractive scale

Chidimma Nwonye, chidimma@breatha.org, Breatha GTE, 03 Trans Amadi Street, Rumuobiakani, Port Harcourt, Rivers State, Nigeria

The Nigerian Journal of Business and Social Sciences, Volume 13, 2026 (Special Issue)
A Journal of the Faculty of Social Sciences, University of Lagos, Akoka, Lagos, Nigeria

1. Introduction

Civic technology has become an important part of West Africa's digital innovation landscape. It offers tools for citizen engagement, public problem solving, service feedback, transparency, and government accountability (Songa & Dabo, 2021; Zhang et al., 2022). From election monitoring platforms in Nigeria to environmental reporting tools in Ghana and public service feedback systems in Senegal, civic technology promises to strengthen the relationship between citizens and government. However, many initiatives remain limited to pilot projects, specific cities, donor-funded cycles, or narrow user groups. Early assessments suggested that fewer than 15% of civic technology initiatives survived beyond 3 years (Knight Foundation, 2015; Making All Voices Count, 2016). More recent evidence confirms that attrition remains a continuing challenge: a 2024 review of 70 civic technology cases found that most failed to achieve long-term success due to financial constraints, low user engagement, and difficulties in scaling impact (Iyer, 2024), while the Civic Tech Innovation Network (2023) notes that sustainability remains the sector's most persistent unresolved problem. Most collapse at the point where they should move from pilot to sustained operation. This failure is rarely caused by broken software. It happens because scaling models often assume that a platform that works in One place can be copied into another. Internet penetration ranges from over 30% in coastal urban centres to less than 10% in rural areas (World Bank, 2021; Research ICT Africa, 2019). Mobile money is mature in some countries and barely present in others (GSMA, 2020). Some governments protect digital rights, while others restrict civic space or shut down the internet (CIPESA, 2025; Cheeseman & Garbe, 2021). Linguistic diversity, low digital literacy in some areas, and unreliable electricity further complicate the picture (IZA & World Bank, 2020). A civic reporting platform designed for high connectivity in Lagos cannot simply be dropped into a low-bandwidth rural context. When civic technologies are copied across these different contexts without real adaptation, the result is extractive scale. Extractive scale here refers to expansion that increases geographic reach, user numbers, or data volume while leaving design authority, data control, and accountability decisions centralised outside the communities the platform claims to serve. The platform may gain more users or expand its geographic coverage, but control remains centralised, local feedback loops break down, and the tool becomes less accountable to the community. This weakens democratic resilience, the ability of democratic institutions to absorb pressure, maintain citizen trust, and sustain accountability under varying conditions (Resnick & Signé, 2026; Levitsky & Ziblatt, 2018). Democratic resilience does not happen automatically when technology is deployed. It requires that civic technology be embedded in local institutions, responsive to local conditions, and governed in ways that distribute control. This paper examines how civic technology solutions can be scaled across diverse West African contexts without losing relevance, accessibility, and local trust. It argues that scaling should not be treated as simple replication. Instead, successful scaling requires adaptive models that combine context-sensitive design, modular technology, local partnerships, hybrid access channels, sustainable financing, and community ownership. The paper is guided by three research questions: (1) What models exist for scaling civic technology across diverse West African contexts? (2) How do contextual factors determine which scaling model works in which setting? (3) How does each scaling model affect democratic resilience, and under what conditions does scale strengthen citizen–state accountability? To answer these questions, the paper draws on a structured integrative review of 36 sources published between 2015 and 2026. It synthesises scaling theory, the Technology-Organisation-Environment framework, and democratic resilience scholarship to build the Adaptive Scaling Matrix for Civic Technology (ASMCT). The paper also

considers AI-enabled civic technology as an emerging layer that intensifies existing questions of data quality, bias, surveillance, and contextual readiness.

2. Theoretical Framework

Before examining the scale of civic technologies, it is necessary to define key terms. Civic technology refers to digital tools and platforms that help citizens engage with government, monitor public services, and hold institutions accountable (Zhang et al., 2022; Schrock, 2019). It is distinct from e-government, which is about government delivering services online. Civic technology is citizen-centred. It exists to strengthen the relationship between people and the state. Scaling means expanding the reach, impact, and sustainability of a solution beyond its original pilot site. It is not just about getting more users. It can also mean adding new features, entering new policy areas, embedding the tool within government systems, or enabling other organisations to replicate the model (Uvin & Miller, 1996; Westley & Antadze, 2010). Diverse contexts refer to the differences among communities that affect whether a solution will work, including internet access, data costs, language, literacy, government openness, regulatory frameworks, funding availability, and public trust (World Bank, 2021; Research ICT Africa, 2019). Democratic resilience is the ability of democratic institutions to absorb pressure, maintain citizens' trust, and keep accountability mechanisms functioning under varying conditions (Resnick & Signé, 2026; Levitsky & Ziblatt, 2018). In civic technology, it means the technology strengthens the feedback loop between citizens and government. If a platform scales but breaks this loop, for example by centralising control or ignoring local government capacity, then it weakens democratic resilience even as it grows. Contextual negotiation is the process by which civic technology actors adapt tools, governance structures, and implementation strategies to align with the specific bundle of infrastructural, linguistic, institutional, and political conditions in a given setting. It includes decisions about who controls the platform, which access channels are used, how data is governed, which languages are supported, how citizens are protected, and how government response is secured. Contextual negotiation therefore links the design of civic technology to the democratic conditions under which it is expected to operate. Extractive scale is the opposite condition: it occurs when a civic technology initiative expands outward without redistributing control, adapting accountability relationships, or strengthening local feedback loops. The paper relies on three theoretical pillars. First, scaling theory explains how social innovations move from small pilots to broader impact. Uvin and Miller (1996) identified three directions: scaling up influences policy, scaling out expands to more people, and scaling big changes relationships and Power structures. Scaling up occurs when an initiative gains enough traction to reshape laws, budgets, or institutional mandates, as when civic technology data leads to new government transparency requirements. Scaling deep is often the most difficult because it requires shifting entrenched Power relations. However, it is the direction most critical to democratic resilience, as it determines whether expanded reach translates into sustained accountability rather than superficial participation. Westley and Antadze (2010) and Westley et al. (2014) added that scaling involves different configurations depending on context, including replication, adaptation, partnership, and platform approaches. Second, the Technology-Organisation-Environment framework argues that the success of technology depends on three factors: the technology itself, the organisation that adopts it, and the environment, including regulation and market conditions (Tornatzky & Fleischer, 1990; Baker, 2012). In this paper, the technology dimension includes platform architecture and access channels. The organisation dimension includes civil society and government capacity. The environment dimension includes digital infrastructure, regulatory openness, funding, and civic trust.

Third, democratic resilience theory provides the standard for outcomes. Levitsky and Ziblatt (2018) argue that democracies survive through shared norms and institutional forbearance. For civic technology, this means evaluating scaling pathways against three indicators: sustained citizen–state feedback loops, distributed control over data, and institutionalised government responsiveness. These three pillars intersect to form the paper's analytical lens.

3. Methodology

This paper uses a structured integrative review. A structured integrative review collects and analyses available evidence using systematic search and transparent screening steps, reducing the bias inherent in narrative reviews (Snyder, 2019; Tranfield et al., 2003). It is distinct from a full systematic review in that the final synthesis was conducted by a single researcher, making the approach integrative rather than exhaustive. In addition to the thematic synthesis, the review incorporated illustrative case examples. These examples were not treated as independent primary case studies but as applied evidence points used to show how the identified scaling pathways operate in practice. This method was chosen because the paper aims to build a conceptual framework from the full body of existing evidence rather than from a single case. The search was conducted across four databases: Google Scholar, Scopus, Web of Science, and African Journals Online. Three sets of Boolean search strings were used. Set One focused on civic technology in Africa. Set two focused on scaling and transfer. Set three focused on democratic resilience and accountability. The search was limited to English-language sources published between 2015 and 2026. Grey literature from the World Bank, GSMA, Research ICT Africa, Code for Africa, and the Civic Tech Innovation Network was deliberately included to capture practitioner evidence that peer-reviewed journals often exclude (Aragon et al., 2020). Inclusion criteria required that sources discuss civic technology deployment or scaling in at least One West African country, address cross-context deployment or sustainability beyond initial funding, and present original empirical findings or theoretical frameworks. Sources were excluded if they focused solely on e-government without citizen engagement, addressed non-African contexts lacking comparative relevance, or were opinion pieces lacking analytical rigour. The initial search produced 312 sources. After removing duplicates, 247 unique records remained. Title and abstract screening excluded 182 sources. A full-text review of 65 sources led to the exclusion of an additional 25. The final corpus contains 36 sources: 22 peer-reviewed articles, 9 grey literature reports, and five programme evaluations. A structured data-extraction template recorded scaling models, contextual factors, barriers, enablers, and implications for democratic resilience for each source. Thematic analysis proceeded in three stages: descriptive coding of pathways and factors, analytical coding into Technology-Organisation-Environment dimensions, and framework synthesis to generate the ASMCT (Braun & Clarke, 2006). The synthesis was iterative, refined when contradictory evidence emerged. The methodological limitations of the review, including the English-language restriction, reliance on grey literature, single-reviewer synthesis, and the need for subsequent empirical testing of the ASMCT, are discussed in Section 7.

4. Contextual Diversity in West Africa

West Africa is not a single market for civic technology. It is a region of sharp contrasts where digital infrastructure, regulation, language, trust, and financing form distinct bundles that determine whether a scaling model will work. Digital infrastructure varies dramatically. Coastal urban centres such as Lagos, Accra, and Dakar have internet penetration rates above 30%, while rural and landlocked areas have rates below 10% (World Bank, 2021; Research ICT Africa, 2019). Mobile internet adoption remains low, with only 20% of adults in the West African Economic and Monetary Union using it, and gender gaps and electricity shortages further fragment access (IZA

& World Bank, 2020). The regulatory environment is equally uneven. Some governments protect digital rights; others restrict civic space, shut down internet access during elections, and surveil online activity (CIPESA, 2025). In Mali, Burkina Faso, and Niger, military transitions have created environments where civic technology is treated as a threat to state authority (Sissoko & Dembele, 2025). In these contexts, scaling requires political risk assessment, not only technical adaptation.
Language, literacy, and trust create additional barriers. English, French, and Portuguese are official languages, but hundreds of local languages dominate daily life. Text-heavy platforms designed for literate urban populations exclude semi-literate communities, making voice-based interfaces and community intermediaries necessary (SEMA & Civic Tech Innovation Network, 2022). In some communities, decades of corruption have eroded public trust; in others, strong civil society organisations can vouch for platforms and pressure government to respond (Resnick & Signé, 2026; Accountability Lab Nigeria, 2025). Press freedom matters too: independent media amplify civic technology data, while restricted media bury it (Kimpact Development Initiative, 2025).
Financing ecosystems differ across contexts. Most civic technology initiatives rely on short-term international donor grants of One to three years. When grants end, platforms shut down because no local revenue model exists (Making All Voices Count, 2016). Government procurement of civic technology services is rare. These dimensions form bundles that define distinct contexts. A replication model that copies a platform from a major metropolis to a rural area will fail because the bundle of conditions has changed.

5. Scaling Pathways

This section examines four models that civic technology actors use to move solutions from One context to another. Each is evaluated against two questions: does it work operationally, and does it strengthen democratic resilience?

5.1 Replication

The replication model copies a civic technology solution with minimal changes. It assumes that what worked in the original context will work in the new One. This assumption comes from Rogers's (2003) diffusion of innovation theory. In West Africa, replication is attractive because it is fast, relatively cheap, and easy for donors to measure. However, it becomes risky when the new context differs structurally from the original One. A reporting platform designed for high-bandwidth urban users may not function in a rural area with poor connectivity. A tool built for English-speaking users may exclude Francophone or local-language populations. Similarly, a model that works in contexts where civil society is strong may fail in contexts where public institutions lack the capacity or willingness to act (Aragon et al., 2020; Making All Voices Count, 2016). *iFollowTheMoney* provides a useful example. Developed by Connected Development (CODE) in Nigeria, the model combines public-expense tracking, community verification, and media advocacy. It has been replicated across multiple African countries (Dabo & Pouyé, 2023). However, CODE's own case study cautions against treating this as a simple, uncritical replication, arguing that because communities differ in context, priorities, and traditions, replication without redesign yields weak results (Connected Development, 2025). The democratic-resilience impact is often negative when replication is treated as transfer without redesign. Citizens may see the platform as an external imposition; control may stay with the originating organisation, and local feedback loops may be severed. In low-trust contexts, replication can raise expectations that government cannot meet, producing cynicism rather than engagement.

5.2 Adaptation

The adaptation model retains the core idea while redesigning features to fit the new context. For example, a smartphone app in a major city might be redesigned to use WhatsApp, SMS, radio, or

community volunteers in a rural area (SEMA & CTIN, 2022). Air quality monitoring projects in Ghana have shown that low-cost sensors require different calibration and data presentation from sensors used in European cities (Hodoli et al., 2024). Citizen science initiatives have adapted data collection methods to local technical capacity, using paper forms where digital devices are unavailable (Fraisl et al., 2022; Danielsen et al., 2014). *SEMA* in Uganda and *MajiVoice* in Kenya illustrate this lesson. *SEMA* combined an SMS chatbot, IoT feedback devices, USSD, and in-person surveys to make the platform usable for people with different levels of digital access (Civic Tech Innovation Network [CTIN], 2022). *MajiVoice* initially assumed SMS would be the primary reporting channel, but users in Nairobi preferred calling; the platform added calling alongside SMS (Ndaw, 2015). However, adaptation has limits. Technical redesign is necessary but not sufficient. A platform adapted to use SMS will still fail if government agencies lack the capacity to receive and act on reports. Democratically, adaptation improves access but does not automatically improve accountability.

5.3 Partnership

The partnership model scales civic technology through collaboration with local organisations. The originating organisation partners with universities, civil society groups, media houses, or government agencies. These local partners adapt the tool, introduce it to communities, verify data, and pressure the government to respond (GovLab, 2020; Danielsen et al., 2014). Partnership is slower than replication but often more sustainable because local partners provide legitimacy, local knowledge, and ongoing support. In low-trust contexts, a respected local NGO or newsroom can vouch for a platform and protect users from backlash. *PesaCheck*, incubated by Code for Africa, provides a strong example. Rather than scaling only through a centralised platform, *PesaCheck* extends its fact-checking work through the African Fact-Checking Alliance. This member-driven network brings together newsrooms and civil society organisations across multiple languages (Code for Africa, 2022). This makes partnership the main scaling mechanism because local journalists adapt content to national languages, political contexts, and audience trust conditions. Democratically, partnership is strong because local partners act as accountability intermediaries, building distributed accountability capacity rather than simply expanding a central tool. The main risk is partner weakness, political capture, or uneven editorial capacity.

5.4 Platform

The platform model builds civic technology as flexible infrastructure that different communities can customise. Instead of a single fixed tool, the organisation creates a core architecture with modules that partners can switch on or off. Code for Africa's sensor network provides open-source hardware and software for air, water, and sound monitoring across multiple countries (Sensors.Africa, 2022). Makerere University's *AirQo* network uses solar-powered, low-bandwidth monitors designed for African cities, with an architecture that allows other cities to join without rebuilding the system (AirQo, n.d.). The impact of democratic resilience depends on governance architecture. If the platform is modular but centrally controlled, with all data flowing to a headquarters abroad, it replicates the democratic risks of replication. If it is designed with local data sovereignty and local administrative control, it distributes Power and strengthens resilience. This governance question becomes even more important for AI-enabled civic platforms, where automated decision-making and opaque model design can intensify the democratic risks of centralised control. The risk is that platform models require technical capacity that many local organisations lack. Without training, the platform sits unused.

5.5 Comparative Summary

The four pathways differ mainly in speed, cost, contextual fit, governance demands, and democratic-resilience effects. Replication may be efficient where contexts are highly similar, but it becomes risky when infrastructure, language, civic trust, or government openness differ. Adaptation improves usability but cannot deliver accountability if institutions cannot or will not respond. Partnership offers the strongest democratic-resilience potential because local actors provide trust, verification capacity, and links to offline accountability systems. Platform-based scaling adds flexibility through modular infrastructure, but its democratic value depends on governance architecture, local technical capacity, and data control. Overall, the strongest route for West Africa is a partnership-based adaptation of modular platforms, because it combines contextual fit, local legitimacy, distributed control, and wider reach.

6. Discussion

6.1 Existing Frameworks, Scaling Patterns, and the Framework Gap

The evidence reviewed in this paper shows that the central problem in West African civic technology scaling is not the absence of digital tools, but the weak alignment between scaling models and contextual readiness. This distinction is important because a civic technology initiative may expand geographically while still failing democratically if it does not preserve trust, local control, citizen-state feedback, and institutional response. The discussion therefore shifts the analysis from what scaling pathways exist to why some pathways strengthen democratic resilience while others reproduce exclusion, centralised control, or weak accountability. This interpretation extends the theoretical foundations of the paper. Uvin and Miller's (1996) distinction between scaling up, scaling out, and scaling deep remains analytically useful, but the evidence suggests that in West Africa these directions rarely occur in isolation. Successful initiatives tend to scale out geographically while also scaling deep institutionally, especially when expansion is supported by localisation, partnership, and accountability work. This suggests that scaling theory should treat depth and breadth as interdependent rather than sequential stages in civic technology contexts.

The Technology-Organisation-Environment (TOE) framework also gains specificity from this analysis. Tornatzky and Fleischer (1990) originally framed the environment dimension in terms of market conditions and regulations. In West African civic technology, the environment also includes political risk, linguistic diversity, civic trust, digital rights, and the availability of international bandwidth. These factors actively reshape what the technology can do and how organisations must operate. A platform model that works in a high-trust environment may become a surveillance risk in a restrictive political context. The TOE framework therefore needs to incorporate political economy and digital-rights dimensions when applied to civic technology in fragile or transitional democracies.

However, while these frameworks explain important parts of the scaling problem, they do not provide a practical diagnostic tool for choosing between scaling pathways. Scaling theory explains the direction of expansion, TOE explains the conditions that shape technology adoption, and democratic resilience theory explains the outcome standard. What remains underdeveloped is a framework that connects these elements and identifies the most suitable scaling pathway under specific contextual conditions. The previous scaling patterns reviewed in this paper clearly reveal this gap. Replication can support rapid expansion, but it is only viable in contexts where contexts are highly similar. Adaptation improves accessibility, but it cannot overcome weak institutional responsiveness on its own. Partnership-based scaling offers stronger legitimacy and accountability, but it depends on the strength and independence of local actors. Platform-based scaling provides

flexibility, but its democratic value depends on governance design, local technical capacity, and data control. These pathways, therefore, cannot be treated as universally transferable models.

This creates the central framework gap that this paper addresses. Existing approaches do not sufficiently demonstrate how civic technology actors, funders, and policymakers should align scaling pathways with contextual readiness conditions and assess the implications for democratic resilience. In West Africa, this gap is especially important because scaling decisions are shaped by uneven infrastructure, regulatory uncertainty, language diversity, short-term donor funding, fragile civic trust, and varying levels of government responsiveness. The Adaptive Scaling Matrix for Civic Technology is proposed to fill this gap. It brings together scaling theory, the Technology-Organisation-Environment framework, and democratic resilience theory into a diagnostic framework for civic technology scaling. Its purpose is to help actors assess when replication, adaptation, partnership, or platform-based scaling is appropriate, and how each pathway may either strengthen or weaken democratic resilience in a given context.

6.2 The Adaptive Scaling Matrix for Civic Technology

The Adaptive Scaling Matrix for Civic Technology (ASMCT) is a diagnostic tool that helps civic tech actors, funders, and policymakers choose the right scaling pathway for the right context. It does this by matching four scaling models to the conditions of the place where the technology is being introduced. It also shows how democratic resilience changes in each match. The matrix is built on the evidence reviewed in this paper. It is a conceptual synthesis of the reviewed literature.

Table 1: **Adaptive Scaling Matrix for Civic Technology**

Contextual Readiness	Replication	Adaptation	Partnership	Platform	Extractive Scale Risk
High infrastructure, high trust, open government	Viable, but should include local co-design to avoid centralised control.	Viable. Stronger when aligned with local languages, response systems, and community ownership.	Strongest option. Preserve trust, feedback loops, and distributed accountability.	Viable when local data control and administrative authority are built into governance.	Generally low where local governance is embedded. However, replication can still become extractive if control remains with the originating organisation, and platform scaling can become extractive if data governance remains centralised.
Low infrastructure, low trust, restrictive government	Not viable. Risks include exclusion, distrust, and unmet expectations.	Fragile. Improves access but cannot overcome weak institutions or political risk on its own.	Most viable. Local actors provide legitimacy, user protection, and offline accountability pressure.	Viable only with partnership, data safeguards, bias checks, and surveillance protections.	High for replication and adaptation if deployed without local institutional anchoring. Platform risk is high if data is centralised or politically exposed, but reduced when local data sovereignty, user protection, and accountability safeguards are designed in.
Mixed or uncertain context	High risk. May produce extractive scale and public cynicism.	Moderately viable. Useful first step, but needs institutional engagement for accountability.	Safest option. Local actors can interpret uncertainty and adapt implementation in real time.	Variable. Requires capacity assessment, partner support, and strong governance safeguards.	Variable across all pathways. Partnership is the primary safeguard because local actors can interpret uncertainty, negotiate legitimacy, and prevent scale from becoming disconnected from community accountability. Platform scaling without partner support remains high risk.

Note: The matrix should be read as a diagnostic tool rather than a fixed rule. It shows how scaling choices can be matched to contextual readiness and democratic-resilience risks. The extractive

scale is included as a warning condition throughout the matrix. It identifies cases where civic technology appears to scale successfully in operational terms but weakens democratic value by centralising control, reducing local accountability, exposing citizen data, or breaking citizen-state feedback loops.

6.3 Interpreting the ASMCT

The Adaptive Scaling Matrix for Civic Technology shows that scaling should not be treated as a universal process of expansion. In West African civic technology contexts, scale becomes democratically meaningful only when matched to local readiness conditions. Rather than assuming that growth is inherently positive, the matrix shows that the same scaling pathway can produce democratically strengthening or extractive outcomes depending on how it is configured and where it is deployed. Extractive scale is therefore the central risk that the matrix is designed to expose. The framework demonstrates that replication, adaptation, partnership, and platform-based scaling each carry different democratic implications depending on context. Replication may be efficient in a high-infrastructure, high-trust, and open-government environment. However, it becomes risky in low-trust or restrictive political contexts because it may expand the use of a tool without redistributing control or securing an institutional response. Adaptation may improve access through local languages, offline channels, or alternative reporting systems, but it cannot create accountability if government institutions lack the capacity or willingness to respond. Partnership-based scaling is more likely to strengthen democratic resilience because it embeds civic technology within local relationships of trust, verification, and accountability. Platform-based scaling offers flexibility, but its democratic value depends on whether governance, data control, and technical capacity are locally distributed rather than centrally controlled. The main value of the ASMCT is that it treats civic technology scaling as a diagnostic decision rather than a technical rollout. It shows that models should be selected based on the interplay among infrastructure, civic trust, government openness, organisational capacity, language needs, data governance, and institutional responsiveness. This is particularly important in West Africa, where digital conditions vary significantly across and within countries, and where weak institutional response, restrictive civic space, linguistic diversity, and infrastructure gaps can turn technological expansion into centralised and unaccountable scale.

6.4 Contribution to Civic Technology Scaling Theory

The ASMCT contributes to scaling theory by linking the direction of scale to its conditions. Existing scaling theory distinguishes between scaling up, scaling out, and scaling deep. However, the evidence reviewed in this paper suggests that civic technology in West Africa often requires these processes to occur together. Civic technology not only needs to reach more users; it must also deepen accountability relationships, influence institutional behaviour, and preserve citizen-state feedback loops. The framework also extends the Technology-Organisation-Environment perspective by showing that the "environment" in civic technology is not only economic or regulatory. It also includes political risk, digital rights, language diversity, civic trust, infrastructure inequality, and government responsiveness. These factors shape whether technology can support democratic resilience or expand without producing accountability. By integrating scaling theory, the TOE framework, and democratic resilience theory, the ASMCT offers a more context-sensitive approach to assessing the expansion of civic technology. It does not assume that growth is automatically positive. Instead, it asks whether growth preserves access, trust, data accountability, and institutional response.

6.5 Practical Recommendations

For civic technology organisations, the ASMCT suggests that scaling should begin with context assessment rather than product readiness. Before expanding a platform, organisations should assess the level of infrastructure, user trust, civic space, government openness, local language needs, digital literacy, and partner capacity in the intended context. This would reduce the risk of transferring a platform into a setting where it cannot be meaningfully used or trusted. Civic technology organisations should therefore adopt a "context first, platform second" approach: diagnose the setting, identify the accountability problem, select the access channel, and only then decide whether replication, adaptation, partnership, or platform-based scaling is appropriate. The framework also suggests that partnerships should not be treated as an optional implementation strategy. In diverse or uncertain contexts, local partners are often central to whether a civic technology initiative becomes legitimate, accessible, and accountable. Civil society organisations, community groups, universities, local media, and government reform actors can help adapt the tool, verify data, support users, and pressure institutions to respond. Without these relationships, civic technology may scale in visibility while remaining weak in democratic impact. Civil society actors should therefore be treated as co-governors of scaling, not merely as outreach channels. Their role should include community validation, risk assessment, language adaptation, data-use oversight, and accountability advocacy. For donors and funders, the ASMCT challenges the common preference for rapid replication and user-number metrics. A platform may reach more people without strengthening accountability. Funding models should therefore reward local adaptation, partner development, translation, offline access channels, data governance, and long-term maintenance. If funders measure only geographic coverage or the number of users, they may unintentionally encourage extractive scale, in which a platform expands but loses its connection to local accountability systems. Funders should support multi-year scaling grants that include resources for localisation, partner capacity building, governance safeguards, and post-pilot maintenance. Evaluation indicators should measure response quality, local ownership, data accountability, and sustained use after donor funding ends. For governments, the framework shows that civic technology cannot strengthen democratic resilience unless public institutions are able and willing to respond. Citizen reports, service complaints, election monitoring data, or environmental alerts have limited democratic value if they do not lead to institutional action. Governments therefore need to invest in response systems, open data practices, digital rights protections, and accountability mechanisms that allow civic technology to become part of public decision-making rather than a parallel system outside the state. Government agencies should designate response units, publish service standards, protect civic data, and create formal channels through which verified citizen feedback can influence budgets, service delivery, and policy decisions. Taken together, these recommendations shift the policy question from "How can civic technology reach more people?" to "How can civic technology scale while preserving trust, local control, citizen safety, and government responsiveness?"

6.6 Artificial Intelligence and the ASMCT

The rise of artificial intelligence makes the ASMCT more urgent, not less relevant. AI-enabled civic technology may include automated misinformation detection, grievance routing, predictive service monitoring, public sentiment analysis, translation tools, or automated complaint classification. These applications may improve speed and scale, but they also intensify the risks already identified in the matrix.

AI deepens the problem of contextual fit because algorithmic systems depend heavily on the data used to train, test, and validate them. In West African contexts where local-language datasets are

limited, administrative data may be incomplete, and rural or marginalised communities may be underrepresented; AI systems can reproduce existing exclusions. An automated grievance-routing system trained on One urban context may misread reports from another linguistic, cultural, or infrastructural setting, making replication especially risky when the platform is AI-enabled. AI also increases the importance of data governance and political context. In restrictive environments, AI-powered civic platforms may generate detailed behavioural data about citizens, complaints, locations, networks, or political concerns. If such data is centrally controlled or poorly protected, the platform can become a surveillance risk rather than an accountability tool. For this reason, AI-enabled civic technology requires partnership-based adaptation, local data safeguards, bias checks, and attention to user safety and political sensitivity.

7. Limitations and Future Research

This review has several limitations that constrain its claims. The English-language restriction may have excluded relevant Francophone and Lusophone scholarship, creating a possible bias toward Anglophone evidence and underrepresenting contexts such as Senegal, Côte d'Ivoire, Guinea-Bissau, and Cape Verde. The inclusion of grey literature was necessary for capturing practitioner evidence, but it introduced some variability in methodological rigour. In addition, because the synthesis was conducted by a single reviewer, independent verification of screening decisions and thematic coding would strengthen confidence in the findings. The ASMCT is proposed as a conceptual and diagnostic framework, not as a fully validated predictive model. It is based on secondary evidence and illustrative case examples, so it requires further empirical testing through comparative case studies, interviews, donor analysis, and field validation across West African contexts. The matrix also uses broad contextual categories, including high-infrastructure, low-trust, restrictive-government, and mixed-or-uncertain contexts. Future research should develop more detailed indicators to measure contextual readiness, such as internet access, data costs, digital literacy, civil society strength, government response capacity, press freedom, data protection enforcement, and local-language availability. The rapid evolution of civic technology and digital policy in West Africa also means that the ASMCT should be treated as a living framework. Future research should examine how it performs across election monitoring tools, public-service feedback systems, environmental reporting platforms, fact-checking networks, and AI-enabled accountability systems. Longitudinal studies are especially needed because democratic resilience cannot be measured solely at launch; it requires evidence of sustained citizen-state feedback, institutional response, local ownership, and continued platform use after donor funding ends.

8. Conclusion

Scaling civic technology across West Africa is not primarily a technical challenge but a political, institutional, and contextual One. The evidence reviewed in this paper shows that civic technology initiatives often struggle when scaling models ignore differences in infrastructure, trust, language, regulation, institutional capacity, financing, and data governance. Replication is fast but fragile; adaptation improves access but cannot guarantee accountability; partnership strengthens legitimacy and trust; and platform-based scaling offers flexibility only when supported by local governance and data safeguards. The paper argues that the most resilient approach is partnership-based adaptation of modular platforms, matched to contextual readiness through the Adaptive Scaling Matrix for Civic Technology. The ASMCT helps civic technology actors, funders, and policymakers assess not only which scaling pathway is viable, but also whether it risks becoming extractive. Civic technology will strengthen democratic resilience only when expansion preserves local control, protects citizens, supports institutional response, and keeps citizen–state feedback loops alive.

References

Accountability Lab Nigeria. (2025). *Shaping Africa's voice in tech accountability and human rights*. https://nigeria.accountabilitylab.org/wp-content/uploads/2025/02/Policy-Brief-Beyond-the-Consumer-Shaping-Africas-Voice-in-Tech-Accountability-and-Human-Rights.pdf

AirQo. (n.d.). *Africa's leading air quality monitoring network*. Makerere University. https://airqo.africa/

Aragón, A., Alvarado, I., Le Dantec, C. A., Flores-Saviaga, C., & Saldivar, J. (2020). Civic technologies: Research, practice and open challenges. In C. Brooks, R. Kocielnik, & I. Lyngs (Eds.), *Proceedings of the 2020 ACM conference on computer-supported cooperative work* (pp. 1–15). Association for Computing Machinery. https://doi.org/10.1145/3313831.3376718

Baker, J. (2012). The technology–organization–environment framework. In Y. K. Dwivedi, M. R. Wade, & S. L. Schneberger (Eds.), *Information systems theory: Explaining and predicting our digital society* (pp. 231–245). Springer.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi.org/10.1191/1478088706qp063oa

Cheeseman, N., & Garbe, L. (2021). *Decoding digital democracy in Africa*. Stanford Digital Civil Society Lab. https://pacscenter.stanford.edu/wp-content/uploads/2021/06/Decoding-Digital-Democracy-Booklet_FINAL-2.pdf

CIPESA. (2025). *State of Internet Freedom in Africa 2025: Navigating the implications of AI on digital democracy in Africa*. Collaboration on International ICT Policy for East and Southern Africa. https://cipesa.org/download/reports/State_of_Internet_Freedom_in_Africa_Report_.pdf

Civic Tech Innovation Network. (2023). *Growing and sustaining African civic tech: A playbook starter*. https://funding.civictech.africa/wp-content/uploads/2023/04/WSG-CTIN-Eng-Report_lr_ds.pdf

Code for Africa. (2022, October 4). *About AFCA*. African Fact-Checking Alliance. https://factcheck.africa/about-afca-658670a36eb5

Connected Development. (2025). *Localization at scale: CODE Nigeria's Follow the Money movement*. https://www.connecteddevelopment.org/localization-at-scale-code-nigerias-follow-the-money-movement/

Dabo, A., & Pouyé, R. (2023). *Assessing civic tech that works to build #TheAfricaWeWant: Citizen-led tech for impact that can help African governments deliver better services*. European Democracy Hub. https://europeandemocracyhub.epd.eu/assessing-civic-tech-that-works-to-build-theafricawewant-citizen-led-tech-for-impact-that-can-help-african-governments-deliver-better-services/

Danielsen, F., Pirhofer-Walzl, K., Adrian, T. P., Kapijimpanga, D. R., Burgess, N. D., Jensen, P. M., Bonney, R., Funder, M., Landa, A., Levermann, N., & Madsen, J. (2014). Linking public participation in scientific research to the indicators and needs of international

environmental agreements: Monitoring environmental agreements. *Conservation Letters*, *7*(1), 12–24. https://doi.org/10.1111/conl.12024

Fraisl, D., Hager, G., Bedessem, B., Gold, M., Hsing, P.-Y., Danielsen, F., Hitchcock, C. B., Hulbert, J. M., Piera, J., Spiers, H., Thiel, M., & Haklay, M. (2022). Citizen science in environmental and ecological sciences. *Nature Reviews Methods Primers*, *2*(1), Article 64. https://doi.org/10.1038/s43586-022-00144-4

GovLab. (2020). *Using collective intelligence to solve public problems*. NYU Tandon School of Engineering. https://burnes-center.directus.app/assets/b3b84db2-296c-435d-968a-8d066c6a7b87

GSMA. (2020). *The mobile economy: Sub-Saharan Africa*. GSMA Intelligence. https://event-assets.gsma.com/pdf/GSMA_ME_SSA_2024_Web.pdf

Hodoli, C. G., Mead, I., Coulon, F., Ivey, C. E., Tawiah, V. O., Raheja, G., Nimo, J., Hughes, A., Haug, A., Krause, A., Amoah, S., Sunu, M., Nyanteh, J. K., Tetteh, E. N., Riffault, V., & Malings, C. (2024). Urban air quality management at low cost using micro air sensors: A Case study from Accra, Ghana. *ACS ES&T Air*, *2*(2), 201–214. https://doi.org/10.1021/acsestair.4c00172

Iyer, N. (2024, February 21). *What happened to civic tech in Africa?* https://neemaiyer.com/work/what-happened-to-civic-tech-in-africa

IZA & World Bank. (2020). *Mobile internet adoption in West Africa* (IZA Discussion Paper No. 13789). https://docs.iza.org/dp14151.pdf

Kimpact Development Initiative. (2025). *Strengthening democratic foundations in Africa: From old to emerging forms of cooperation* [Event report]. https://www.kimpact.org.ng/publications/83/details

Knight Foundation. (2015). *Assessing civic tech: Case studies and resources for tracking outcomes*. https://kf-site-production.s3.amazonaws.com/publications/pdfs/000/000/179/original/NI_Knight_CivicTechAssessment_Mar2015.pdf

Levitsky, S., & Ziblatt, D. (2018). *How democracies die*. Crown.

Making All Voices Count. (2016). *Transforming governance: What role for technologies?* Institute of Development Studies. https://www.makingallvoicescount.org/

Ndaw, M. F. (2015). *Unlocking the potential of information and communications technology to improve water and sanitation services*. World Bank Group https://openknowledge.worldbank.org/bitstreams/9970faa9-7b75-54f5-9e0d-5ee8e14ca101/download

Research ICT Africa. (2019). *Understanding digital access and use in the global south: 2019 final technical report. IDRC Digital Library.* *https://idl-bnc-idrc.dspacedirect.org/items/3770a29b-7139-4a07-92a4-15215fc07cee*

Resnick, D., & Signé, L. (2026). Improving democratic resilience in Africa: Lessons from comparative case studies. *Brookings Institution*. https://www.brookings.edu/articles/improving-democratic-resilience-in-africa-lessons-from-comparative-case-studies/

Rogers, E. M. (2003). *Diffusion of innovations* (5th ed.). Free Press.

Schrock, A. R. (2019). What is civic tech? Defining a practice of technical pluralism. *Proceedings of the ACM on Human-Computer Interaction*, *3*(CSCW), 1–22. https://doi.org/10.1145/3359200

SEMA & Civic Tech Innovation Network. (2022). *Connecting citizens and services to improve societies*. https://civictech.africa/case-study/connecting-citizens-and-services-to-improve-societies/

Sensors.Africa. (2022). *Pan-African citizen science initiative for air, water, and sound monitoring*. Code for Africa. https://sensors.africa/

Sissoko, E. F., & Dembele, K. (2025). Artificial intelligence and fragile democracy in West Africa: Between digital repression and citizen mobilization. *International Journal of Innovative Science and Research Technology*, *10*(10), Article IJISRT25OCT151. https://doi.org/10.38124/ijisrt/25oct151

Snyder, H. (2019). Literature review as a research methodology: An overview and guidelines. *Journal of Business Research*, *104*, 333–339. https://doi.org/10.1016/j.jbusres.2019.07.039

Songa, A., & Dabo, A. (2021). *The role of civic tech in consolidating democracy in Africa*. European Partnership for Democracy. https://epd.eu/2021/12/09/the-role-of-civic-tech-in-consolidating-democracy-in-africa/

Tornatzky, L. G., & Fleischer, M. (1990). *The processes of technological innovation*. Lexington Books.

Tranfield, D., Denyer, D., & Smart, P. (2003). Towards a methodology for developing evidence-informed management knowledge by means of systematic review. *British Journal of Management*, *14*(3), 207–222. https://doi.org/10.1111/1467-8551.00375

Uvin, P., & Miller, D. (1996). Paths to scaling up: Alternative strategies for local NGOs. *World Development*, *24*(12), 1861–1874. https://doi.org/10.1016/S0305-750X(96)00080-2

Westley, F., & Antadze, N. (2010). *Making a difference: Strategies for scaling social innovation*. Social Innovation Generation, University of Waterloo. https://ccwestt-ccfsimt.org/wp-content/uploads/2023/06/strategies_for_scaling_social_innovation.pdf

Westley, F., Antadze, N., Riddell, D. J., Robinson, K., & Geobey, S. (2014). Five configurations for scaling up social innovation: Case examples of nonprofit organizations from Canada. *Journal of Applied Behavioral Science*, *50*(3), 234–260. https://doi.org/10.1177/0021886314532945

World Bank. (2021). *The size and distribution of digital connectivity gaps in sub-Saharan Africa*. World Bank Group. https://documents1.worldbank.org/curated/en/099241003142325200/pdf/IDU0cb2e42f3050260484d0b8370b84eee303ecf.pdf

Zhang, Y., Lim, C. P., Perrault, A., & Wang, Y. (2022). A review of research on civic technology: Definitions, theories, history and insights. *Information and Learning Sciences*, *123*(1/2), 1–18. https://doi.org/10.1108/ILS-09-2021-0073