International Journal of Modern Computer Science and IT Innovations (IJMCSIT)
eISSN: 3087-4289
Volume03 Issue11 | Page No: - 01-13

Received: 09 Oct. 2026, Revised: 15 Oct. 2026, Accepted: 28 October 2026, Published: 09 November 2026

DOI: https://doi.org/10.55640/ijmcsit-v03i11-01

# An Adoption Framework for Coordinating Policies, Partnerships and Civil-Society Interventions to Bridge the Digital Divide in Nigeria

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**ABSTRACT:** Nigeria attacks its digital divide through three largely separate streams: government policy and regulation, public–private partnerships (PPPs) that finance infrastructure and skills, and civil-society programmes that build digital literacy, rights awareness and trust. Each has produced gains. Yet by November 2025 broadband penetration stood at 50.58% against a 70% national target, rural communities trailed urban ones in internet access by 34 percentage points, and Nigerian women remained about a quarter less likely than men to use mobile internet. Synthesising policy documents, regulatory data and the digital-divide literature, this paper argues that these shortfalls reflect weak coordination more than weak effort. Drawing on Van Dijk's resources-and-appropriation model, Riggins and Dewan's adoption-cycle perspective and Szabó's structural–cognitive–motivational classification of barriers, it proposes a four-layer Adoption Framework: a government-led Enabling Layer, a PPP-driven Financing and Delivery Layer, a civil-society-led Last-Mile and Adoption Layer, and a Coordination and Feedback Layer that carries community-level evidence back into policy. A six-year phased roadmap, formally defined monitoring indicators, application scenarios and adoption barriers are presented, with the Universal Service Provision Fund and the 3MTT programme treated as working Nigerian templates for cross-actor coordination.

**KEYWORDS:** Digital inclusion; adoption framework; public–private partnerships; civil society; Universal Service Provision Fund

## 1. Introduction

Nigeria's digital ambitions sit on an awkward paradox. The country has Africa's largest mobile market by subscriptions, a crop of globally visible technology start-ups and a fintech sector that has matured quickly, yet a large share of its people are still offline or only marginally connected. Broadband penetration reached 50.58% in November 2025, up from 44.43% in December 2024, with broadband subscriptions at roughly 109.7 million (Techpoint Africa, 2026). Total internet subscriptions climbed to about 148.2 million by December 2025, even as the price of a gigabyte of data roughly doubled following tariff adjustments (Tribune Online, 2026). Those national figures hide a stubborn spatial split. Speaking at the Rural Connectivity Summit in October 2025, the Executive Vice Chairman of the Nigerian Communications Commission (NCC) put internet access at about 57% in urban areas but only 23% in rural communities, where more than 45% of Nigerians live (Maida, 2025).

The problem is not only technical. Digital access now shapes who can learn online, use e-government services, reach a doctor remotely, save and borrow through mobile money, or take part in civic life. Nigeria's divide therefore bears on several Sustainable Development Goals at once: SDG 1 and SDG 8 through income and employment, SDG 4 through digital learning, SDG 5 through women's access to and use of digital tools, SDG 9 through broadband infrastructure, SDG 10 through the inclusion of rural and low-income groups, and SDG 16 through access to information and accountable institutions. It is also no longer a simple line between the connected and the unconnected. The literature now distinguishes a first-level divide in physical and material access, a second-level divide in skills and patterns of use, and a third-level divide in the outcomes, whether educational, economic, civic or health-related, that access and skills actually deliver (Van Dijk, 2006, 2017; Lythreatis et al., 2022). A complementary classification sorts the causes of exclusion into structural barriers (infrastructure, affordability, devices), cognitive barriers (literacy, awareness, training) and motivational barriers (trust, perceived usefulness, cultural fit) (Szabó, 2024). Both

lenses help explain why adding connectivity, on its own, has not closed Nigeria's gap.

There is no shortage of activity. Successive federal governments have issued broadband plans and a national digital-economy strategy; private capital has financed subsea cables and co-funded skills programmes; and civil-society organisations have run digital-literacy and digital-rights work for well over a decade. What is missing is a framework that treats these streams as parts of one system rather than as parallel efforts that occasionally touch. This paper takes up that task. Instead of cataloguing what each actor has done, it combines the documented Nigerian record with the wider digital-divide and ICT-adoption literature to build an Adoption Framework: a model that specifies which actor is best placed to tackle which dimension of the divide, how the resulting layers should be financed and sequenced, and how a standing coordination mechanism can keep them aligned over time.

## 2. Theoretical Framework

Van Dijk's resources-and-appropriation model is the paper's main analytical lens (Van Dijk, 2005, 2020b). The model begins with categorical inequalities such as income, education, employment, location and gender. These shape the unequal distribution of material, mental, social and cultural resources, which in turn govern a sequence of technology appropriation. Motivational access asks whether people want to use digital technology at all; physical access whether a device and a connection are obtainable; skills access whether people have the operational, informational and strategic competencies to use them productively; and usage access how often, how widely and how meaningfully they actually use them. The sequence is also a loop. Unequal outcomes feed back into unequal resources, so digital inequality tends to reinforce the social inequality that produced it (Van Dijk, 2020a). Van Deursen and Van Dijk (2019) sharpen the point in a way that matters for Nigeria: even where basic connectivity is widespread, a material-access divide persists in the quality of devices, the reliability of connections and the running costs of keeping both.

Three further strands refine this model. The first is the OECD's (2001) early framing of the divide around access, price and use, which links participation to infrastructure, cost, household income, education and location, and makes plain that infrastructure alone does not guarantee meaningful use. The second is Riggins and Dewan's (2005) treatment of the divide as an ICT adoption cycle of innovation, access and use, recurring at individual, organisational and national levels. They separate first-order inequality in access from second-order inequality in the ability to use technology once acquired, and they warn that private incentives do not automatically line up with public inclusion goals, a caution with obvious consequences for how PPPs should be governed. The third is Szabó's (2024) structural–cognitive–motivational classification, which turns these broad inequalities into conditions that an intervention can actually target: whether digital solutions are available and affordable, whether people understand and can use them, and whether they see enough value, and feel safe enough, to take part.

Together these perspectives supply the organising logic of the framework. Nigeria's three intervention streams map, imperfectly but recognisably, onto different stages of Van Dijk's sequence and different corners of Szabó's classification. Government infrastructure policy works mainly on physical access and structural barriers. PPP financing works on physical access and, increasingly through programmes such as the Three Million Technical Talent (3MTT) initiative, on skills. Civil-society work concentrates on motivation, cognition and usage. A second theoretical input comes from the literature on universal service and access funds, which treats levy-financed redistribution as a correction for the tendency of liberalised telecommunications markets to under-invest in commercially unattractive areas, while documenting how weak institutions, poor data and political interference blunt that correction in many African countries (Arakpogun et al., 2017, 2023). This literature underpins the framework's Financing and Delivery Layer (Section 8), which extends the logic of Nigeria's Universal Service Provision Fund (USPF) to PPP arrangements more generally.

## 3. Methodology

The study is desk-based and document-driven; it builds a conceptual framework by synthesis rather than through primary fieldwork. Four kinds of material were reviewed. The first is Nigerian policy and legal documents, among them the Nigerian National Broadband Plan (NNBP) 2020–2025, the Nigerian Communications Act 2003 and the Nigeria Data Protection Act 2023. The second is quantitative reporting from the NCC and from international bodies such as the GSMA and the International Telecommunication Union (ITU), used to establish the current state of access, affordability and the gender gap. The third is peer-reviewed and grey literature on digital-inclusion programmes, universal service funds, PPPs and civil-society interventions in Nigeria and comparable settings. The fourth is the broader digital-divide and ICT-adoption literature, from foundational conceptual work (OECD, 2001; Riggins & Dewan, 2005; Van Dijk, 2005, 2006, 2017, 2020a, 2020b) to recent reviews and classification studies (Ireland & Lestari, 2025; Lythreatis et al., 2022; Szabó, 2024).

The framework was developed inductively. Recurring

patterns in the reviewed sources (what has worked, what has stalled, and where responsibility has been unclear) were grouped into functional layers and then ordered using Van Dijk's sequential-access model, refined by Riggins and Dewan's adoption cycle and Szabó's barrier classification. Where official statistics were used, figures were checked against the original NCC or GSMA release wherever one was available, and against at least one independent report where it was not. Monitoring indicators were then given formal definitions (Section 8.5) so that progress can be computed consistently across actors. The result is a synthesis device for guiding coordinated adoption, not a statistically validated model. The field as a whole is thin on evidence that follows interventions through to their outcomes (Van Dijk, 2006; Ireland & Lestari, 2025), and this paper shares that limitation, as Section 13 acknowledges.

## 4. The Digital Divide in Nigeria: Current State

Nigeria's telecommunications sector has grown enormously since liberalisation ended the monopoly of Nigerian Telecommunications Limited (NITEL) and the Nigerian Communications Act 2003 consolidated the regulatory regime (Federal Republic of Nigeria, 2003). Growth, however, has been uneven. Between December 2023 and December 2024 the NCC recorded a fall in teledensity from 103.66% to 76.08%, and in internet subscriptions from about 163.8 million to 139.3 million, mainly because SIM cards not linked to a verifiable National Identification Number (NIN) were deactivated (NCC, 2025). Subscriptions recovered to roughly 148.2 million by December 2025 (Tribune Online, 2026). Data consumption kept rising through the whole period, by about 35% in 2025 to a projected 13.2 million terabytes (AllAfrica, 2026). The SIM clean-up is a useful reminder that headline penetration figures partly measure administrative records rather than people.

The rural–urban gap is the most persistent feature of this landscape. The NCC's own figure of 57% urban against 23% rural internet access (Maida, 2025) sits comfortably with academic evidence. Using state-level data, Adeleke (2021) found that market size, employment, income, access to electricity, urbanisation, gender, old age and telephone density all significantly shaped the spatial distribution of internet use across Nigeria. Gender compounds the picture. The GSMA's 2026 survey reports that 56% of Nigerian men but only 42% of women use mobile internet, which makes women about 26% less likely to be online and places Nigeria among the widest gaps the GSMA measures (GSMA, 2026; Technology Times, 2026). Affordability has also moved the wrong way: the average price of a gigabyte rose from about ₦287 to ₦575 after the 2025 tariff adjustments (Tribune Online, 2026), far above the NNBP's affordability benchmark of ₦390 per gigabyte. Figure 3 summarises the access gaps and the broadband trajectory.

Read through the first-, second- and third-level lens, Nigerian policy has concentrated on first-level indicators such as penetration, coverage, fibre kilometres and base stations. Second-level attention to skills has grown, most visibly through 3MTT, but remains uneven. Third-level outcomes, meaning whether access actually improves employment, learning, health or civic participation, are the least measured dimension of all, a gap to which Section 6 returns.

## 5. Review of Existing Interventions

Before a coordinating framework can be proposed, it helps to be clear about what each stream has achieved and where each has fallen short. This section summarises that record.

### *5.1* Government Policy

The NNBP 2020–2025 aimed to lift broadband penetration to 70%, deliver minimum download speeds of 25 Mbps in urban and 10 Mbps in rural areas, cover at least 90% of the population, and cap data prices at ₦390 per gigabyte, framed as 2% of median income (Federal Ministry of Communications and Digital Economy, 2020). By the plan's end, penetration had only just passed 50%, and industry reporting attributed the shortfall to Right-of-Way (RoW) charges, multiple levies, high energy costs and slow last-mile expansion (TechCabal, 2025). Several of these constraints had already been named in the preceding 2013–2018 plan. The USPF, created under the Nigerian Communications Act 2003, is Nigeria's main redistributive instrument. Financed from an operator levy, it runs access and connectivity programmes for rural and under-served areas, including base-station subsidies under the Accelerated Mobile Phone Expansion project, the Rural Broadband Initiative, community resource centres and ICT-adoption workshops (Universal Service Provision Fund [USPF], n.d.). Civil-society review has argued that the Fund needs retooling: many Nigerians are unconnected because of affordability rather than infrastructure alone, and the USPF's own count of 97 unserved and under-served clusters, covering about 27.9 million people, understates the real scale of exclusion (Centre for Information Technology and Development [CITAD], 2024). Continental evidence points the same way. Across Africa, universal service funds are hampered by weak policy design, limited stakeholder involvement, unreliable data and slow disbursement; twelve fund authorities surveyed by the GSMA reported holding US$265 million in unspent levies (Arakpogun et al., 2017; GSMA, 2023).

More recent federal initiatives broaden the agenda. A programme announced in 2024 to connect all 774 Local Government Area (LGA) secretariats, co-anchored by

NigComSat and Galaxy Backbone, targets structural access directly (Jaiyeola, 2024). Project BRIDGE, backed by a US$500 million World Bank loan approved in September 2025, plans about 90,000 km of new fibre and expects roughly US$1.1 billion of its US$1.6 billion cost to come from private investors (Ecofin Agency, 2025a). The value of both depends on whether fibre reaches anchor institutions such as schools, primary health centres and community hubs, rather than stopping at government offices. The NCC's Nigeria Digital Connectivity Index ranks the 36 states and the Federal Capital Territory on broadband readiness, including RoW waivers (Ecofin Agency, 2025b), and the National Gender Digital Inclusion Strategy, unveiled in 2025, sets a target of at least 40% female participation in national digital-skills programmes (ITEdgeNews, 2025). Neither will achieve much without budgets, measurable targets and civil-society partners. The 3MTT programme, launched in December 2023, marks a shift toward skills-level policy: about 30,000 fellows completed its first phase and around 270,000 enrolled across later cohorts, against a goal of three million by 2027 (3MTT, n.d.; TSM House, 2025). To avoid becoming credential-rich but opportunity-poor, programmes of this kind need firm links to labour-market demand, mentoring, devices and broadband. The Nigeria Data Protection Act 2023, which created the Nigeria Data Protection Commission (NDPC), rounds out the architecture by addressing trust, a precondition Szabó (2024) treats as a motivational barrier in its own right (King'ori, 2023; NDPC, n.d.).

RoW reform remains one of the most consequential unfinished items. High and inconsistent charges across states raise the cost of every kilometre of fibre. The broadband plans and independent analysts have both identified them as a binding constraint, and reputational tools such as the Connectivity Index have not yet been enough to remove it.

### *5.2* Public–Private Partnerships

Google's Equiano subsea cable, landed in Lagos in April 2022 by the West Indian Ocean Cable Company (WIOCC), shows how privately financed infrastructure, facilitated by government, can add national bandwidth on a scale neither party could reach alone (SubTel Forum, 2022). The 3MTT programme also relies on private co-financing, including a Google.org-backed grant for its DeepTech_Ready AI-skills cohort and Microsoft-funded certification vouchers (Federal Ministry of Communications, Innovation and Digital Economy, 2025; TSM House, 2025). Project BRIDGE goes further, building private capital into the financing structure of a national fibre backbone (Ecofin Agency, 2025a). The USPF levy is itself a partnership in the classical universal-service sense, redistributing revenue from a concentrated market, in which MTN and Airtel held about 86% of subscriptions in December 2025 (Tribune Online, 2026), toward areas the market would not serve unassisted. At sub-national level, free public Wi-Fi schemes in Lagos, Anambra, Edo, Ekiti and Rivers States now operate under a NITDA public-access regulatory framework (Meatechwatch, 2024).

Infrastructure sharing of towers, ducts, backhaul and power systems offers another way to lower costs in commercially marginal areas. Low-earth-orbit satellite services can extend coverage where fibre is not yet feasible, although equipment and subscription costs currently make them more useful as backhaul for schools and clinics than as a household option for low-income users. Digital-finance partnerships suggest a further pathway. Mobile money operators, payment service banks and agent networks have reduced financial exclusion and created their own reasons for people to come online, echoing the wider lesson that technology spreads when it is simple, locally relevant, compatible with the devices people already own and backed by enabling regulation (Samuel-Okon & Abejide, 2024). Device financing, by contrast, remains underdeveloped relative to its importance: the GSMA finds that a missing internet-enabled handset is a leading reason why Nigerian women who know about mobile internet still do not use it (GSMA, 2026).

Across these examples, private partners gravitate toward commercially viable areas, which is exactly where Nigeria's access gap is smallest. The USPF is the one mechanism designed to push against that bias. The pattern fits the broader warning that commercial incentives do not automatically serve public inclusion goals (Riggins & Dewan, 2005), and the African evidence that universal-service arrangements falter when accountability, stakeholder participation and data are weak (Arakpogun et al., 2017, 2023). PPPs in this space should therefore be seen not as government plus business, but as governed arrangements with defined responsibilities, performance indicators, affordability requirements, under-served-area obligations and channels for community feedback.

### *5.3* Civil Society

Paradigm Initiative (PIN), founded in 2007, is Nigeria's best-known digital-inclusion organisation. It runs the LIFE programme (Life skills, ICT, Financial literacy and Entrepreneurship) for young people in under-served communities, a Digital Readiness Programme for girls and the Dufuna software-engineering school (Paradigm Initiative, n.d.). Its digital-rights work has produced policy briefs on Nigeria's digital-identity process and support for the Digital Rights and Freedom Bill (Paradigm Initiative, 2020, 2024), and the forum it has convened since 2013, now the Digital Rights and Inclusion Forum, has become a fixture of

Africa's digital-rights calendar (Paradigm Initiative, 2023). In Northern Nigeria, CITAD works on community networks, rural connectivity advocacy and regulatory engagement, and has pressed for the USPF to fund affordability and meaningful use rather than infrastructure alone (CITAD, 2024). Equal Access International's USAID-funded Tech4Families project (2018–2020) tackled the gender divide in Northern Nigeria by working with whole families, using an interactive curriculum and radio drama to shift the household norms that restrict women's and girls' use of technology (Equal Access International, n.d.).

Community-based organisations also take part in USPF-convened workshops on ICT adoption, utilisation and sustainability in under-served areas (USPF, n.d.). The broader evidence supports this layer. Infrastructure availability does not by itself translate into use, and affordability, literacy and local trust decide whether a new connection is taken up (Van Deursen & Van Dijk, 2019; CITAD, 2024). The literature treats civil society as an intermediary that facilitates technology transfer, trains, raises awareness and monitors social effects (Samuel-Okon & Abejide, 2024), and Szabó (2024) recommends formalising that role through community internet centres and community representation in the design of digital tools. Civil-society engagement also has a governance side. A 2025 survey of Nigerian citizens found that social media had become a primary channel for e-participation in government, although trust and access shaped who took part (Oludu et al., 2025). Civil-society-supported adoption is therefore both an input to digital inclusion and one of its outcomes.

The obvious limitation of this stream is scale. Documented beneficiary numbers for individual programmes run to hundreds or a few thousand people, a small fraction of the tens of millions of Nigerians who remain offline or under-connected, and the sector as a whole is underfunded relative to the task.

## 6. Cross-Cutting Barriers to Meaningful Inclusion

Looking across the three streams, six barriers recur whichever actor is responsible. The first is infrastructure: gaps in the fibre backbone, weak last-mile networks, unreliable electricity, high RoW costs and, increasingly, vandalism. Between January and August 2025 the sector reported some 19,384 fibre cuts and more than 3,000 equipment thefts (Maida, 2025). The second is affordability. A household can sit inside network coverage and still be excluded if data, devices, electricity or repairs are beyond its means, and device costs have worsened with currency depreciation and import dependence; globally, mobile broadband remains unaffordable in about 60% of low- and middle-income countries (International Telecommunication Union [ITU], 2025). The third is digital literacy, which is unevenly distributed by age, gender, occupation, education and location and tends to widen rather than narrow as physical access improves (Van Dijk, 2006). The fourth is gender inequality, driven not only by income but by household power relations, safety concerns, social norms and limits on mobility. The fifth is weak institutional coordination across the communications, education, power, finance and health ministries and the 36 state governments, each holding a piece of the problem. The sixth, which this paper treats as the most consequential for framework design, is thin attention to third-level outcomes. Most programmes report inputs and outputs, such as centres built, fibre laid and fellows trained, rather than whether people found work, learned more or earned more as a result (Riggins & Dewan, 2005; Lythreatis et al., 2022).

Two further conditions run through all six. Digital inequality follows and reinforces wider social inequality. Ireland and Lestari (2025) stress intersectionality: location, income, age, gender and education combine to produce compounded disadvantage that national averages conceal. Sun and Metros (2011) show, in an education setting, that socio-economic status can be both a determinant of technology access and a confounder when its effects are evaluated, a caution that applies to any future evaluation of this framework. And monitoring practice across Nigerian programmes has tended to measure what is easiest to count rather than what matters most. Recent reviews make the same criticism of the field generally and argue for outcome-oriented evaluation in place of static, input-focused measurement (Van Dijk, 2006; Ireland & Lestari, 2025).

## 7. Rationale for an Adoption Framework

Sections 5 and 6 point to a consistent pattern. Each stream is competent within its own domain but poorly coordinated with the other two. Government diagnoses structural cost barriers accurately, plan after plan, without removing them. PPP financing delivers real capacity, but where returns are highest. Civil society builds literacy and trust at a scale too small to matter nationally without outside money and reach. None of this is a failure of intent; it is a failure of coordination. Nigeria nonetheless already has working templates for cross-actor coordination. The USPF's levy-financed cross-subsidy is one; 3MTT's blend of public direction, private finance and NGO-linked delivery partners is another. What is lacking is a general framework that formalises this logic across the whole of Nigeria's digital-inclusion effort, so that it is not reinvented programme by programme.

There is also a gap in the literature. Existing scholarship explains many components of the divide and recommends stakeholder collaboration in general terms.

Vitalis et al. (2025), for example, conclude that Nigeria must tackle infrastructure, economic and literacy constraints together, and Arakpogun et al. (2023) call for cross-sector collaboration and bottom-up initiatives around universal service funds. Neither, however, specifies how government policy, PPP quality and civil-society participation should interact as one adoption system. The framework that follows is meant to address both the coordination gap in practice and this systems-level gap in research.

## 8. The Proposed Adoption Framework

### *8.1* Design Principles

Four design principles, each drawn from the review above, shape the framework.

- **Sequential fit:** each layer is assigned to the actor best positioned to deliver it, following Van Dijk's sequence of motivational, physical, skills and usage access and Szabó's barrier classification, rather than assuming that any one actor can work across every level.
- **Redistributive default:** every new PPP infrastructure or financing arrangement carries an explicit obligation to cross-subsidise unserved and under-served areas, extending the USPF's levy logic instead of treating redistribution as a separate, smaller programme.
- **Local delivery, national scale:** civil-society and community models that prove themselves locally are scaled formally through co-financing with government and PPP partners, rather than remaining permanently pilot-sized.
- **Closed-loop coordination:** a standing mechanism tracks shared indicators across all three streams and feeds field evidence back into policy revision, closing the gap between diagnosis and implementation seen across successive broadband plans and addressing the weak measurement of third-level outcomes noted in Section 6.

### *8.2* Framework Architecture

The framework organises Nigeria's digital-inclusion effort into four layers, shown in Figure 1 and summarised in Table 1. The first three correspond to the actor categories reviewed in Section 5; the fourth is the coordination mechanism that links them. Figure 1 also shows the access stage and barrier type each layer mainly addresses.

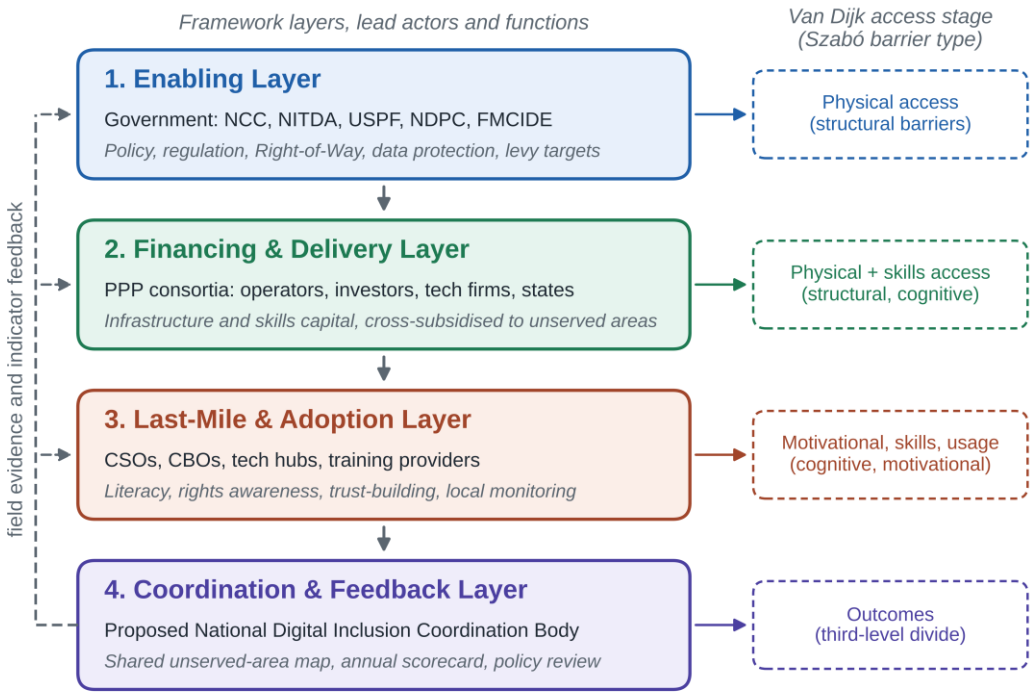



**Figure 1.** The four-layer Adoption Framework, the actors that lead each layer, and the Van Dijk access stage and Szabó barrier type each layer chiefly addresses. Dashed arrows show the feedback of field evidence and indicators from the Coordination and Feedback Layer to the other three layers.

**Table 1**

**The Adoption Framework's four layers, lead actors and functions**

| Layer | Lead actor(s) | Primary function in the framework |
|---|---|---|
| 1. Enabling Layer | Federal and state government (NCC, NITDA, USPF, NDPC, FMCIDE) | Sets policy direction, regulation, spectrum and RoW rules, data-protection law and redistributive financing targets (NNBP, NDPA, USPF levy). |
| 2. Financing & Delivery Layer | PPP consortia (mobile network operators, cable and fibre investors, technology firms, state governments) | Mobilises capital and technical capacity for infrastructure and skills, cross-subsidised toward unserved areas through USPF-linked obligations. |
| 3. Last-Mile & Adoption Layer | Civil-society organisations, CBOs, tech hubs, training providers | Turns available infrastructure into use: digital literacy, rights awareness, community trust-building and monitoring of local outcomes. |
| 4. Coordination & Feedback Layer | Proposed National Digital Inclusion Coordination Body | Aligns the three layers, tracks shared indicators, resolves overlaps and feeds field evidence into policy revision cycles. |

The framework is layered rather than a strict pipeline. The Enabling and Financing and Delivery Layers have to operate at the same time, because regulatory certainty, such as harmonised RoW charges and licensing terms, determines what private finance is willing to commit. The Last-Mile and Adoption Layer can begin literacy and trust-building work in a community before full infrastructure arrives, provided the Coordination and Feedback Layer keeps expectations aligned. That concurrency is itself a break with Nigerian practice, in which infrastructure planning, skills programmes and civil-society advocacy have usually run on separate timelines set by separate institutions.

### *8.3* The Coordination and Feedback Layer in Detail

The fourth layer is the framework's main structural addition. It proposes a National Digital Inclusion Coordination Body drawing members from the NCC and USPF, NITDA and the Federal Ministry of Communications, Innovation and Digital Economy (FMCIDE), the main PPP partners (mobile network operators, infrastructure investors and technology firms), and civil-society organisations such as Paradigm Initiative and CITAD. It would not duplicate the regulatory powers that the NCC and NITDA already hold. Instead it would carry out three tasks that no existing institution is mandated to perform: maintain a shared, regularly updated map of unserved and under-served communities that all three streams use for targeting; publish an annual cross-actor scorecard built on the indicators defined in Section 8.5; and convene a structured review that feeds field evidence, including civil-society monitoring data, into future broadband plans and USPF strategy cycles. The design answers a specific weakness. Both Nigerian civil-society review and continental studies of universal service funds identify poor targeting data as a constraint on subsidy effectiveness (Arakpogun et al., 2017; CITAD, 2024).

### *8.4* Phased Adoption Roadmap

Adoption is proposed in three phases over six years (Figure 2; Table 2). The timetable is deliberately conservative and reflects the pace at which Nigeria's broadband plans have actually moved rather than an idealised schedule.

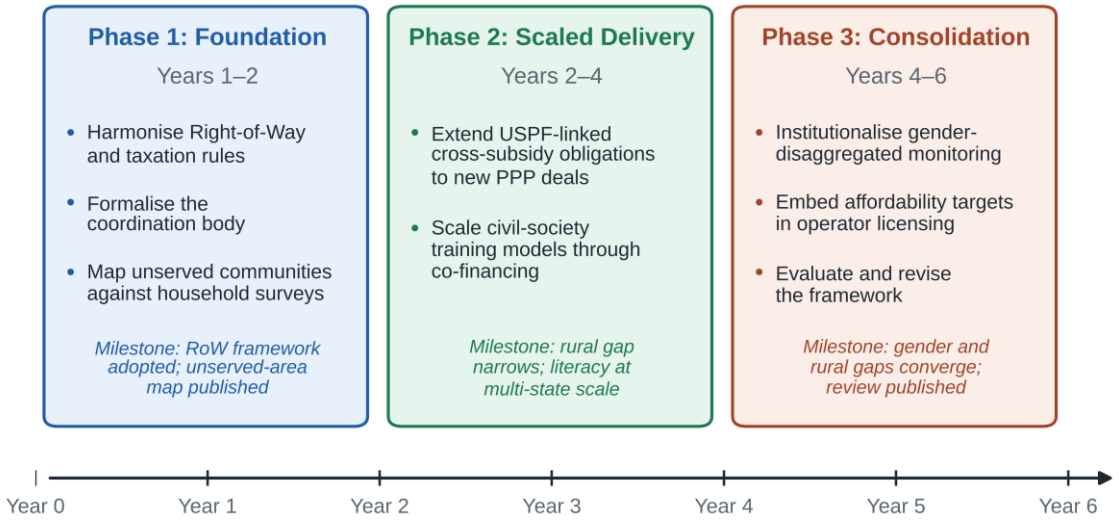



**Figure 2.** Indicative six-year roadmap for adopting the framework, showing the focus and milestone of each phase. Phases overlap at their boundaries so that later activities can begin as foundations are completed.

**Table 2**

**Indicative phased roadmap for framework adoption**

| Phase | Focus | Indicative milestones |
|---|---|---|
| Phase 1: Foundation (Years 1–2) | Harmonise RoW and taxation rules; formalise the coordination body; map unserved communities against household survey data. | National RoW framework adopted; unserved-area map published; coordination body inaugurated; baseline scorecard (Equation 5) published. |
| Phase 2: Scaled Delivery (Years 2–4) | Extend USPF-linked cross-subsidy obligations to new PPP infrastructure deals; scale civil-society training models through co-financing. | Rural–urban gap (Equation 1) narrows measurably; literacy programmes reach multi-state scale. |
| Phase 3: Consolidation (Years 4–6) | Institutionalise gender-disaggregated monitoring; embed affordability targets in operator licensing; evaluate and revise the framework. | Gender gap (Equation 2) and rural–urban gap move toward national averages; affordability ratio (Equation 3) reaches the 2% benchmark; framework review published. |

### *8.5* Monitoring Indicators

In keeping with the closed-loop principle, progress should be tracked against a small set of indicators shared by all three streams, rather than separate metrics reported in isolation by each actor. To make the scorecard reproducible, the core indicators are defined formally below. The rural–urban access gap, in percentage points, is

$$G_{\mathrm{RU}} = A_{\mathrm{U}} - A_{\mathrm{R}} \qquad (1)$$

where AU and AR are the percentages of urban and rural communities with internet access. With the NCC's current figures, GRU = 57 − 23 = 34 percentage points (Maida, 2025). Following the GSMA's convention, the mobile-internet gender gap expresses how much less likely women are than men to use mobile internet:

$$G_{\mathrm{G}} = \frac{U_{\mathrm{m}} - U_{\mathrm{f}}}{U_{\mathrm{m}}} \times 100\% \qquad (2)$$

where Um and Uf are the shares of men and women who use mobile internet. The rounded 2026 survey values (56% and 42%) give a gap of 25%; the GSMA reports 26% because it computes the gap from

unrounded estimates (GSMA, 2026; Technology Times, 2026). Affordability is measured against income rather than in naira alone, consistent with the NNBP's own benchmark of 2% of median income:

$$AR = \frac{P_{\text{GB}}}{Y_{\text{med}}} \times 100\% \qquad (3)$$

where PGB is the average price of one gigabyte and Ymed is median monthly income per person. The NNBP target corresponds to AR ≤ 2%, which in 2020 implied ₦390 per gigabyte (Federal Ministry of Communications and Digital Economy, 2020). Because the indicators come in different units, each is normalised as the share of the distance from its baseline to its target that has been covered:

$$\tilde{x}_{k,t} = \frac{x_{k,t} - x_{k,0}}{x_k^* - x_{k,0}} \qquad (4)$$

where xk,0 is the baseline value of indicator k, xk* its target and xk,t its value in year t. The formula works for indicators that should fall (such as gaps) as well as those that should rise. The annual scorecard then aggregates the normalised indicators into a single progress score:

$$S_t = \sum_{k=1}^{K} w_k \tilde{x}_{k,t}\,, \qquad \sum_{k=1}^{K} w_k = 1 \qquad (5)$$

in which the weights wk are agreed by the coordination body and published with the scorecard. Equal weights are a sensible default until there is evidence to justify others. A value of St = 0 means no movement from the baseline and St = 1 means that all targets have been met. Finally, the reach of USPF-linked PPP obligations is tracked as the cumulative share of the baseline unserved population that has been connected:

$$C_t = \frac{N_t^{\text{conn}}}{N_0^{\text{uns}}} \times 100\% \qquad (6)$$

where $N_0^{\text{uns}}$ is the unserved population at baseline (about 27.9 million people in the USPF's 2022 clusters; CITAD, 2024) and $N_t^{\text{conn}}$ the number of those people newly connected by year t. The full indicator set is:

- rural–urban internet access gap, GRU (Equation 1), against the current 34-point baseline (Maida, 2025);
- mobile-internet gender gap, GG (Equation 2), against the current 26% baseline (GSMA, 2026);
- data affordability ratio, AR (Equation 3), against the NNBP's 2%-of-median-income benchmark;
- coverage of the baseline unserved population, Ct (Equation 6), through USPF-linked PPP obligations;
- civil-society digital-literacy beneficiaries reached through co-financed, scaled programmes, disaggregated by state and gender; and
- third-level outcome indicators (employment, learning, access to health services and civic participation attributable to digital adoption), reported annually instead of being left to occasional external research (Ireland & Lestari, 2025).

Figure 3. Baseline values for the framework's headline indicators. (a) Internet access in urban and rural communities (Maida, 2025) and mobile-internet use by men and women (GSMA, 2026). (b) Broadband penetration from December 2023 to November 2025 against the NNBP 2025 target of 70% (NCC, 2025; Maida, 2025; Techpoint Africa, 2026).

## 9. Applying the Framework: Illustrative Scenarios

### *9.1* Rural Broadband Rollout in an Under-Served State

A state flagged on the Coordination Layer's shared map of unserved areas would trigger a bundled response. The Enabling Layer agrees harmonised RoW terms with the state government in advance. The Financing and Delivery Layer structures the deployment as a PPP with an explicit USPF-linked cross-subsidy obligation, building on existing USPF–operator arrangements and, where relevant, on Project BRIDGE's fibre routes. Meanwhile the Last-Mile Layer starts digital-literacy and device-affordability outreach through local civil-society partners, timed so that people are ready to use the connection when it arrives rather than beginning only after the infrastructure is finished. Progress shows up directly in Ct and, over time, in GRU.

### *9.2* Scaling a Civil-Society Literacy Model

A programme such as Paradigm Initiative's LIFE curriculum, proven with cohorts of hundreds in particular cities, would be scaled through the Financing and Delivery Layer using the 3MTT partner network as a template. Government sets curriculum standards and provides convening authority; technology firms supply funding and technical content; and the originating organisation keeps delivery leadership in communities where it already has trust and presence, rather than being displaced by a new government-run programme.

### *9.3* Closing the Gender Gap in Mobile Internet Use

The annual scorecard would keep the gender gap, GG, as a standing priority, in line with the National Gender Digital Inclusion Strategy. The Enabling Layer would add gender-disaggregated reporting to operator licence conditions. The Financing and Delivery Layer would negotiate affordable-smartphone financing with mobile network operators, since handset ownership is a leading barrier for Nigerian women who already know about mobile internet (GSMA, 2026). The Last-Mile Layer would deliver targeted training for women and girls through programmes such as PIN's Digital Readiness Programme and family-based models like Tech4Families, scaled through the co-financing mechanism described

above.

## 10. Emerging Technologies and the Framework's Forward Look

Artificial intelligence and automation are already changing what meaningful use means in Van Dijk's sequence, so the framework should be read as a design that will have to evolve. AI tools have real potential in the sectors that matter most to Nigeria's inclusion agenda: adaptive tutoring in education, diagnostic and triage support in under-resourced clinics, and advisory and market-access services for smallholder farmers (Samuel-Okon & Abejide, 2024). These applications depend on the same foundations the framework already targets (connectivity, devices and skills), and if they arrive first they are likely to benefit digitally prepared urban users while leaving rural and low-income populations further behind. AI also raises governance risks that bear directly on trust, including data privacy, algorithmic bias and the near-absence of Nigerian languages from most AI systems. These risks map onto the motivational and cognitive barriers discussed in Section 2. Lythreatis et al. (2022) go further, identifying algorithmic awareness and data inequality as possible new levels of the divide.

For the framework this implies two extensions rather than a fifth layer. The Enabling Layer's data-protection and trust mandate, already anchored in the Nigeria Data Protection Act 2023, should extend explicitly to AI governance and algorithmic accountability. The Last-Mile and Adoption Layer's curricula should add AI literacy to basic digital skills as 3MTT and its successor programmes mature. Seen this way, emerging technology tests the framework's durability rather than demanding a new one.

## 11. Anticipated Barriers to Adoption

The framework synthesises documented Nigerian practice; it is not a tested institutional design. Several barriers to its adoption should be stated plainly.

Institutional turf: a joint coordination body risks being seen as overlapping with the mandates of the NCC, NITDA and USPF, and would need clear statutory delineation to avoid duplicated or conflicting authority.

Financing discipline: extending redistributive obligations to all new PPP deals, not just USPF-administered ones, requires financing and enforcement mechanisms that Nigerian licensing does not yet contain. The large unspent balances reported across African universal service funds suggest that collection is easier than disbursement (GSMA, 2023).

Market concentration: with MTN and Airtel holding about 86% of the market in December 2025 (Tribune Online, 2026), a framework that leans on operator obligations concentrates delivery risk in two commercial actors.

Data and targeting gaps: the shared unserved-area map at the heart of the Coordination Layer depends on data that have historically been weak (Arakpogun et al., 2017; CITAD, 2024).

Political and budget cycles: Nigeria's federal structure and changes in ministerial leadership have disrupted programme continuity before, and any multi-year mechanism must be designed to survive them.

Misaligned commercial incentives: private partners' objectives do not automatically converge with public inclusion goals, so the framework's redistributive obligations need active, continuing governance rather than one-off contractual commitments (Riggins & Dewan, 2005).

## 12. Recommendations for Adoption

Establish the Coordination and Feedback Layer through a statutory instrument or ministerial directive that defines its convening role relative to the NCC, NITDA and USPF, rather than leaving coordination informal.

Pilot the redistributive-obligation principle on the next major PPP infrastructure deal, such as a Project BRIDGE concession, using the USPF levy model as a template, before mandating it sector-wide.

Co-finance one or two proven civil-society models, such as Paradigm Initiative's LIFE programme or CITAD's community-network approach, for multi-state scale-up through the 3MTT partner network, as a proof of concept for the Last-Mile Layer.

Commission a national data-integration exercise that combines NCC coverage maps with household survey data, as the technical basis for the shared targeting map and for the baseline N0uns in Equation 6.

Publish the first cross-actor scorecard, computed with Equations 1–6, within the first year of adoption so that a credible baseline exists before Phase 2 scale-up begins.

Pair infrastructure investment with a national device-affordability strategy that combines local-assembly incentives, tax relief on entry-level devices and certified refurbished-device markets, so that the Financing and Delivery Layer's obligations extend from connectivity to the devices needed to use it.

Support the shift of rural telecommunications sites toward renewable and hybrid power, reducing the diesel costs that make rural connectivity commercially unattractive and strengthening the business case for

redistributive obligations rather than relying on subsidy alone.

## 13. Limitations and Directions for Further Research

This paper's limitations mirror the weaknesses it identifies in the field. First, the Adoption Framework is a conceptual synthesis, not a statistically validated model; its layers and principles were derived inductively from documented practice and the literature and have not been tested against primary data. Second, there is little Nigeria-specific empirical evidence on how government policy, PPP effectiveness and civil-society participation interact as a combined system, so the claim that coordination failure drives slow progress remains plausible rather than proven. Third, several statistics used here, including the rural–urban access figures and the post-tariff data prices, come from regulatory speeches or industry reporting rather than from published survey microdata, and should be replaced with survey-based estimates as these become available. Fourth, any empirical test of the framework should treat socio-economic status and other intersecting characteristics as both explanatory and potentially confounding variables, following Sun and Metros (2011) and Ireland and Lestari (2025).

Future research should test the framework's core constructs (policy support, regulatory effectiveness, infrastructure adequacy, affordability, PPP effectiveness, civil-society participation, digital literacy, trust and sustained use) as independent, mediating and dependent variables in a Nigeria-specific adoption model, using longitudinal data where possible. Piloting the scorecard in Equations 1–6 in two or three contrasting states would be a practical first step and would also show whether the proposed weights and targets are realistic.

## 14. Conclusion

Nigeria's rural–urban and gender divides have proved more stubborn than its broadband headlines suggest. The reason is not that government, private and civil-society actors have failed individually. It is that their efforts have run in parallel rather than in concert, and that policy attention has centred on first- and second-level indicators of access and skills while third-level outcomes remain barely measured. This paper has reviewed the record of each stream, placed it within the digital-divide and ICT-adoption literature, and used both to build a four-layer Adoption Framework (Enabling, Financing and Delivery, Last-Mile and Adoption, and Coordination and Feedback) that assigns each actor to the part of the divide it is best placed to address and adds a coordinating function no Nigerian institution currently holds. The framework is built from what already works in Nigeria, from the USPF's redistributive levy to 3MTT's blended financing, and its indicators are defined precisely enough to be computed and audited. Adopting it would not mean abandoning any existing instrument. It would mean that government, PPP partners and civil society begin to measure their contributions, and their progress toward the SDGs that digital inclusion serves, as parts of one deliberately sequenced system.

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