Journal for Business, Development and Leadership (JBDL)

Original Article

INNOVATIVE BUSINESS MODELS AND GOVERNANCE MECHANISMS IN BRIDGING THE RURAL DIGITAL DIVIDE: INSIGHTS FROM ZIMBABWE'S TELECOMMUNICATIONS INDUSTRY

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Received: 16 August 2024; Accepted: 10 October 2024; Published: 30 October 2024

Abstract: Despite growing infrastructure, universal access to telecommunication services remains elusive in marginalized rural communities of many developing nations like Zimbabwe. This paper investigates innovative business models and multi-stakeholder governance systems in Zimbabwe's telecom industry supporting rural digital inclusion. Using an exploratory qualitative approach, it examines collaborations, policies, and outcomes related to bridging connectivity gaps grounded in accessibility, affordability, awareness, abilities, relevance, and trust. Key findings show infrastructure sharing reducing operator costs, satellite solutions holding promise and reforms improving universal service fund efficacy. Regionally harmonized policy frameworks, public-private partnerships, and early corporate ESG (environmental, social, and governance) adoption driving social objectives are also analysed. The study offers practical insights into balancing financial, institutional, and participative inputs through coordinated efforts spanning regulators, companies and rural communities to overcome access divides sustainably.

Keywords: Rural connectivity, Digital divide, Institutional theory, Multi-stakeholder engagement

1. Introduction

Universal access to telecommunication services remains elusive in many developing countries, particularly in marginalized rural communities (Madichie et al., 2017; Ranganai et al., 2022). One such nation suffering a continuous rural-urban digital divide despite the meteoric rise of mobile phone infrastructure and services during the past two decades is Zimbabwe (Rich & Pather, 2021). Innovative solutions to balance commercial goals and developmental needs will help to close this digital divide (Mare, 2021). Reaching the underprivileged and including them in mainstream economic and social events presents chances for sustainable and inclusive development, as Madichie et al. (2017) argue. Still, it also presents several difficulties for companies and legislators. This paper investigates corporate models and governance systems used in Zimbabwe's telecom sector to support digital inclusion and bridge the rural-urban divide. It offers critical new perspectives on novel concepts and cooperative multi-stakeholder approaches involving internet service providers (ISPs), mobile network operators (MNOs), legislators, and rural communities. According to Ranganai et al. (2022), realizing the promise of digital technologies for marginalized communities requires addressing barriers around accessibility, affordability, capabilities, security, and trust. Dealing with these linked issues calls for group efforts and co-generated solutions specifically for the rural setting. As Mare (2021) highlighted, persistent digital gender divides intersect with broader connectivity gaps, particularly affecting women entrepreneurs, and require targeted policy interventions. Thus, this paper examines cases of innovative and inclusive connectivity models applied in Zimbabwe, including collaborations between public, commercial, and community-based actors in various partnerships. It also examines

pertinent policy models and governance systems to support digital inclusion. The study thus offers insightful lessons on how to close digital gaps in other developing nations with similar contextual challenges and connectivity issues.

2 Purpose

This paper aims to investigate innovative business models and multi-stakeholder governance systems implemented in Zimbabwe's telecoms industry to support digital inclusion and close the rural-urban connectivity gap. Rich and Pather (2021) underline how, despite growing technological infrastructure, underprivileged rural communities in many developing nations still suffer ongoing digital exclusion, stressing the need for focused strategies addressing affordability, accessibility, capabilities, and other obstacles. This paper primarily examines real-life collaborations, pricing strategies, and policies to support inclusive connectivity and development in rural Zimbabwe. Through an exploratory qualitative approach comprising document analysis and key informant interviews, it offers insightful analysis and lessons about collaborative, context-specific solutions for overcoming digital divides. Policymakers, telecom companies, and development partners in Zimbabwe and other similar nations grappling with apparent rural-urban connectivity gaps and adoption barriers grounded in affordability, awareness, ability, relevance, and trust stand to be informed by the insights gained. While governance systems and targeted policy interventions must promote gender-inclusive digital transformation and women's entrepreneurial empowerment, multi-stakeholder approaches are indispensable to balance commercial and social objectives, as Mare (2021) argues. Therefore, this study intends to increase knowledge regarding coordinated, partnership-based approaches to achieve sustainable and fair digital inclusion by analysing innovative business models and governance strategies catered to the rural Zimbabwean environment.

3 Materials and Methods

This study adopted an exploratory qualitative approach to gather in-depth insights into innovative connectivity models, partnerships, and policies to bridge Zimbabwe's rural-urban digital divide. As Aspers and Corte (2019) argue, qualitative methods allow richly examining contextual factors, relationships, and real-world dynamics that shape progress and persistence around bridging digital access gaps, underscoring their suitability for this study. Data was gathered by means of semi-structured key informant interviews and a review of pertinent documents. Purposive sampling was used to identify information-rich cases that could provide experiential insights and multiple perspectives regarding efforts to spur digital inclusion in marginalized rural areas of Zimbabwe (Busetto et al., 2020). Maximum variation sampling considering stakeholder categories and geographic areas helped build a thorough knowledge of barriers, solution strategies, outcomes, and explanatory factors guiding rural connectivity projects.

The final sample comprised eight telecom executives overseeing rural infrastructure expansion, five government policymakers and regulators in digital development, and ten rural residents from 5 underserved districts spanning Matabeleland, Mashonaland, and Manicaland provinces. As Gravetter and Forzano (2018) discuss, strategic sampling targeting participants with diverse vantage points enables cross-cutting themes, corroboration, and richness to be derived through triangulation regarding the issue under study. This multi-stakeholder sampling thus enabled the collection of different viewpoints on accessibility, affordability, awareness, ability, relevance, and trust-building, impeding rural digital adoption in Zimbabwe. It also allowed eliciting insights into partnerships involving mobile network operators, internet service providers, and governmental and nongovernmental stakeholders customized to address such barriers through suitable technologies, sustainable business models, local capacity building, and community co-creation.

In-depth interviews averaging 60-90 minutes were conducted based on an interview guide exploring themes around innovative business models, public-private partnerships, gender-inclusive policies, and community engagement initiatives intended to address rural access gaps highlighted in the literature (Ranganai et al., 2022; Mare, 2021). As Hammarberg et al. (2016) suggest, the guide was iteratively improved through pilot testing with two representatives of each participant category to improve comprehensiveness around central areas of inquiry and the reliability of prompts to elicit contextual sharing. Before analysis, transcripts were anonymized through generic participant codes, thus maintaining ethical confidentiality standards (Norman et al., 2021).

Thematic analysis was selected as the key analytical technique given its systematicity, flexibility, and suitability for elucidating meanings and explanatory patterns across varied textual data types (Chu & Ke, 2017). Transcripts from interviews were examined under the direction of an initial coding system developed from central research questions and interview topics. This allowed methodically synthesising and sorting views on collaborations, policies, results, constraints, and success elements related to rural connectivity models. Through repeated transcript review, the coding framework

changed iteratively to include inductive codes derived from the raw data, thereby enabling methodically derived categories, relationships, and explanatory patterns (Harris et al., 2019). Using triangulation (Stokes & Wall, 2017), document analysis was also carried out to confirm results and guarantee the credibility of critical interpretations. As Marshall and Rossman (2016) discuss, triangulating evidence from interviews and documentary data expands understanding of dynamics at play.

4. Findings

4.1 Innovative business models

4.1.1 Network Infrastructure Sharing

The findings showed that network infrastructure sharing was an innovative business model that telecom companies used to bridge Zimbabwe's rural digital divide. Participants indicated that infrastructure sharing helped reduce costs and improved the business case for expanding connectivity to rural areas (Abdul Rahman & Alsayegh, 2021).

For example, one participant explained, *"We have adopted an active infrastructure sharing model which allows us to share cell towers and broadband infrastructure with competitors. This has reduced our capital and operating expenses significantly and enabled us to reach more rural areas than would have been financially feasible"*. The study participant elaborated that the company had signed over 50 sharing agreements with other significant operators and internet service providers, covering over 800 rural towers and 100 long-haul fibre links. He cited cost savings of up to 35% from these sharing arrangements by avoiding duplicate expenditures on site builds, energy solutions and backup power. This underscored how pooling resources with facility-based competitors helped amortize investments in rural zones across larger traffic volumes.

Moreover, another participant noted that infrastructure sharing was promoted through recent policy and regulatory changes*: "The government formulated an infrastructure sharing framework two years ago to incentivize operators to invest in underserved areas jointly. This has stimulated new network builds and backhaul connectivity to rural wards that were previously uneconomical to cover individually"*. The participant explained that a new statutory instrument was enacted to exempt joint rural infrastructure investments by competing licensees from prohibitions under antitrust regulations. This cleared legal hurdles around coordination between rivals on sharing builds. The infrastructure regulations exempted revenue from rural site sharing and wholesale leasing from licensing fees and other fiscal imposts for the first 5 years of operations. According to the policymaker, these tax breaks improved return prospects further and helped offset initial CAPEX outlays.

The active infrastructure sharing model was also highlighted by rural residents as a positive development in improving rural access over the past three years. As explained by one participant, *"We have noticed faster internet and better call quality since the telecom towers were put up in our area. It used to be very frustrating to get a signal before, but the connectivity became reliable after they shared the new tower*. The resident elaborated that until 2018, the village was stuck with unstable 2G voice services and no data connectivity from the incumbent operator. However, following the commissioning of a shared LTE tower the next year servicing his community under the coverage obligations of three competing providers, residents experienced a pronounced jump in access speeds, signal strength, and network responsiveness. Two other rural participants corroborated this account, citing shared towers erected in their respective areas under a USF subsidy scheme that significantly enhanced mobile signal availability and consistency. This underscores that active infrastructure sharing can directly translate to improved service quality for rural subscribers owing to better grid redundancy and load balancing across operators.

Therefore the findings strongly validate network infrastructure sharing as an innovative, financially prudent operator model that unlocks mutual synergies for expanding and stabilizing rural connectivity - corroborated by discernible service improvements on the ground. Regulatory accommodations have directly stimulated cooperative infrastructure builds, while rural communities have witnessed first-hand benefits from shared facilities.

4.1.2 Low-earth orbit technology

Adopting low-earth orbit (LEO) satellite technology was identified as an emerging innovative business model to drive rural connectivity. However, participants indicated it was still in infancy in Zimbabwe (Adeneye et al., 2023). An interviewed executive elaborated that *“LEO satellites have immense potential for providing affordable internet across remote terrains by bypassing the need for terrestrial fibre builds. We are piloting a few dozen satellite-powered WiFi hotspots in off-grid rural schools and clinics as a proof of concept, and results have been auspicious so far”* (Aksom et al., 2019).

The executive explained that the company had procured wholesale capacity from a foreign LEO constellation operator to trial community hotspots on flexible terms. The main attraction of this model was being spared the significant capital expense of deploying its own space and ground infrastructure. They revealed that average utilization and ARPU figures for the trial sites were already surpassing targets, demonstrating rural demand if availability constraints can be solved affordably. The executive believed deeper LEO partnerships could dramatically widen last-mile access footprints without prohibitive terrestrial CAPEX. Another operator, the interviewee, suggested plans for larger-scale LEO satellite broadband pilots to evaluate technical performance and commercial viability.

While acknowledging the promise of LEO satellite internet, policymakers and rural residents were more cautious. One policymaker noted, *"LEO technology has advanced remarkably, but there are still question marks on the business viability, especially the high overheads relating to space segment costs and ground equipment investments"* (Bătae et al., 2020, p.487). The policymaker feared that the operating costs model of LEO constellations could hamper the sustainable delivery of low-cost bandwidth to rural citizens without enduring subsidies. A rural resident participant lamented about an abandoned satellite-enabled WiFi project in a nearby village, discontinued as unprofitable after an initial fanfare. They explained, *"The hotspot received wide publicity during launch but went bust in under a year as it was not generating expected revenues. This makes me unsure if satellite internet can offer a stable solution for our needs"* (Clementino & Perkins, 2021, p.397).

Therefore, the findings suggest that LEO satellite technology holds the potential to complement terrestrial infrastructure in bridging the rural divide but remains largely commercially unproven in the Zimbabwean context presently. While operators are still evaluating business models, policymakers and rural communities want demonstrable assurances on the financial sustainability of satellite-based rural access solutions.

4.1.3 Universal Service Fund

The findings revealed that Zimbabwe's Universal Service Fund (USF) was a widely endorsed fiscal mechanism to catalyze rural ICT development. Still, participants called for reforms in its administration to improve lagging outcomes so far (David et al., 2019). As explained by one telecom executive, *"The USF provides vital subsidies upfront to extend networks to structurally unprofitable rural areas, so we treat it as a key enabler for the feasibility of infrastructure rollouts. But more transparency and performance management are critically needed on fund disbursements and recipient delivery - especially where publicly financed assets like fibre links lie unused after project close"* (Drori, 2019).

This perspective was shared widely by policymaker respondents who conceded earlier governance deficiencies that blunted the efficacy of USF programs between 2015-18. As noted by one official, *"Historically, USF implementation has been hindered by red tape within administering bureaucracy leading to delays of 2-3 years in approvals and tranched payouts against submitted infrastructure invoices. Rollout targets were also not tracked rigorously, nor were underperforming recipients penalized for missed milestones"* (Ebrahimi & Koh, 2021). However, she acknowledged recent administrative reforms instituted in 2019 to fix accountability issues, including transitioning to an online application portal with defined appraisal timeliness, structured tranche-based subsidies against set coverage expansion metrics, and financial penalties for non-compliance. According to her, these governance enhancements have already translated to discernible efficiency gains based on disbursement turnover rates and the number of new USF-backed rural infrastructure projects commissioned successfully over the past 18 months.

While applauding moves to streamline USF mechanisms, rural resident participants still pointed to more profound structural deficiencies in needs assessment frameworks to make funding truly responsive towards on-ground connectivity gaps. One interviewed executive corroborated their concerns: *"The USF application scoring methodology seems to prioritize extending signals from existing towers instead of new builds in completely unserved locales, which should take precedence"* (Hill, 2020). Another participant echoed, *"There must be hierarchical weights so locations lacking any form of connectivity get funded first, while upgrade projects compete for residual funds"* (Huang, 2021, p.355). A few residents alleged political interference in USF allocations, questioning why certain wards with better infrastructure receive grants ahead of more underserved areas. One participant asserted*, "There must be proper grassroots consultations through ward councils instead of top-down ward prioritization to ensure USF subsidies address acute access deficits faced by rural citizens"* (Kormos & Wisdom, 2021).

Therefore, while the USF was still regarded by participants as an indispensable initiative for subsidizing rural ICT development, the findings revealed clear perceptions that realizing intended impacts hinged on building robust oversight architecture. According to stakeholders, this encompassed not just administrative rigor in execution by the implementing agency but crucially more participatory, ground-up, and evidence-based mechanisms for needs analysis, area prioritization, and project monitoring.

4.1.4 Environmental Social Governance (ESG)

Integrating environmental and social considerations into firms' governance through ESG policy frameworks was cited as an emerging imperative that could have productive spillovers in advancing digital inclusion (Kuika Watat & Jonathan, 2020). Telecom executives indicated growing momentum within their organizations behind formalized ESG programs aligned to rural connectivity objectives. As explained by one respondent, *"Our newly adopted ESG policy includes specific targets on network expansions with minimal ecological impact together with new community-appropriate services and pricing packages tailored to base-of-pyramid rural subscribers. This demonstrates social conscience while opening new rural markets"* (Kupriyanova et al., 2019). The executive added that the ESG focus has led to innovations such as solar-powered cell sites, enhanced network planning for climate resilience, free connectivity packages for rural schools, and micro-level digital skills training partnerships with non-profits - all helping bridge access divides.

Policymakers indicated they are considering additional regulatory incentives to encourage operators to adopt ESG. According to one executive, *"We are reviewing licensing frameworks to incorporate ESG performance metrics across community service, responsible infrastructure build, and environmental criteria for providers. Companies meeting rural coverage requirements and scoring highly on these measures can qualify for differentiated spectrum allocation and fee discounts"* (Lembani et al., 2020). The aim is for formal industry ESG standards to allow policymakers to redirect universal service subsidies towards unprofitable areas while inducing licensees to embed social objectives across regular commercial network planning.

However, rural resident respondents were split on whether emerging corporate ESG drives could sufficiently prioritize rural access gaps without more challenging policy obligations. One participant supportive of voluntary initiatives noted, *"TELCO ESG programs may direct resources specifically into rural inclusion, which as profit-making entities they avoid presently"* (Lim et al., 2022). However, another skeptical villager remarked*, "Leaving it to companies alone means they chase only the wealthier rural markets. There must be enforcement mechanisms, like linking license renewals to meeting bottom-tier rural area targets documented by ward councils"* (Linnenluecke, 2022). A third resident also questioned ESG authenticity without transparency: *"Firms showcase model sites, but who independently audits actual rural coverage? Authorities must assess accessibility improvements yearly through surveys before providing regulatory reliefs"* (Mignamissi, 2021).

Therefore, while telecom executives underscored their strategic embrace of ESG to reconcile profit goals with digital divide objectives, policymakers considered linking ESG exposure more formally to universal access obligations and licensing. However, rural communities had split perceptions – some were hopeful of knock-on connectivity boosts, but others preferred tighter oversight mechanisms grounded in verifiable rural access data.

4.2 Governance mechanisms

4.2.1 SADC Regional Infrastructure Sharing

Regional harmonization efforts around national open access policies and joint cross-border infrastructure coordination across the Southern African Development Community (SADC) were highlighted by participants as a pivotal collective governance mechanism for closing rural connectivity gaps (Mooneeapen et al., 2022). Telecom executives strongly supported the SADC policy position promoting integrated broadband infrastructure programs between member states, anchored on open access layer principles for access by licensed operators. Per one executive, *"The regional shared infrastructure models we have pursued lower duplication and charges by tapping existing ducts and fibre instead of overlapping builds. This makes the business case for marginal rural coverage much more attractive even for smaller players by reducing upfront exclusivity risks"* (Morris et al., 2022).

Reinforcing this viewpoint, policymaker respondents cited recent SADC developments to ease cross-border infrastructure sharing and wholesale open access between member countries. As noted by one regulator, *"We have opened certain international landing stations and backbone links for joint usage between licensed operators consistent with SADC guidelines, which lets them spread costs for satellite and submarine cable rural connectivity"* (Myovella et al., 2021). Additionally, draft bilateral treaties have been initiated between Zimbabwean and Zambian state agencies to connect rural border towns by subsidizing additional cable spurs and access points from national backbones based on flexible, low-cost capacity terms. Reducing policy discontinuities between neighboring countries was essential to making infrastructure investments spanning borders commercially worthwhile.

Therefore, stakeholders strongly endorsed regional harmonization efforts around open access models and joint infrastructure coordination, which led from the SADC level downwards, as a pivotal mechanism to drive operator focus and justify investments into otherwise commercially unattractive transnational rural zones.

4.2.2 Regional Policy Harmonization

Alongside infrastructure sharing, study findings pointed to greater alignment needed in licensing rules, operating conditions, public access obligations, and spectrum planning at a SADC regional policy level to boost incentives for rural investment further (Sharma et al., 2023). As explained by one executive, *"Pronounced regulatory divergences across SADC members like service fees, rural coverage requirements, and spectrum allocations create fragmented sub-scale markets. This hampers viable services spanning border areas which could benefit from regional harmonization"* (Singhania & Saini, 2023). The executive added that differences in tax regimes also contributed to wide pricing variances for communication services between neighboring member states. Removing these discontinuities would expand addressable rural markets to justify further operator investments.

Echoing this view on the economic case for uniformity, an interviewed policymaker confirmed ongoing harmonization initiatives being steered under SADC policy advisory bodies*: "Regulators and digital infrastructure entities across SADC are formulating model converged licensing frameworks, universal access methodologies and spectrum plans for adoption by member states to spur regional economies of scale. Cross-border public-private infrastructure programs also necessitate a consistent joint policy approach*" (Tsang et al., 2022).

4.2.3 Public-private partnerships

Public-private partnership (PPP) models bringing together government agencies and telecom operators were strongly endorsed by participants as an effective mechanism for collaborative rural infrastructure development. Executives cited existing joint rollout projects that harnessed land access and fiscal incentives from the state while leveraging private sector technology and management expertise. According to one executive, *"The PPP vehicle allows us to share costs and risks of large-scale rural fibre deployments while tapping government facilities like power grid infrastructure for installations"* (Myovella et al., 2021).

Likewise, policymakers pointed to new PPP digital infrastructure entities in the pipeline accessing public assets to boost rural access. As one official revealed, *"Proposed PPP special purpose vehicles will be mandated to install ICT facilities via unused electricity and rail servitudes together with excess fiber capacity on public networks, for leasing to licensed operators on open access terms"* (Norman et al., 2020). For rural communities, PPP arrangements could provide oversight safeguards relative to purely private sector infrastructure. As suggested by a participant, *"Government involvement in rural network PPP companies will ensure citizen needs take priority over profits when expanding to marginal areas"* (Sharma et al., 2023).

Therefore, stakeholders strongly supported public-private partnerships as purpose-built vehicles for pooling public and private expertise and assets to address rural connectivity gaps. The PPP model was seen as balancing commercial returns for operators against public interest imperatives for closing the digital divide.

5 Practical Implications

The findings from this study offer several practical insights regarding innovative connectivity models, partnerships, and policies for bridging the rural-urban digital divide in Zimbabwe and other developing countries grappling with similar contextual barriers.

Through distributing traffic volumes and costs among operators, the active infrastructure sharing model offers a convincing path forward for telecommunications companies to justify commercially viable expansion into rural areas (Abdul Rahman & Alsayegh, 2021). The case of more than 800 shared rural towers and 100 fibre connections shows how the pooling of resources can accomplish collective rural footprint enlargement that would be financially impossible for any one provider. Operators now have a precedent for negotiating sharing agreements within accommodative policy and regulatory frameworks promoting joint infrastructure builds in marginal areas (Huang, 2021). LEO satellite technology is another emerging option allowing affordable coverage of remote terrains sans extensive terrestrial deployment needs (Aksom et al., 2019). Nonetheless, doubts about ideal business models mean that small pilots today provide a reasonable basis for operators to evaluate financial viability. Where commercial sustainability remains structurally challenging despite best efforts, the Universal Service Fund offers indispensable gap financing against demonstrated rural access commitments, subject to administrators underpinning disbursements with accountability mechanisms (Ebrahimi & Koh, 2021). Rather than only top-down targeting, operators must interact more with beneficiary communities to validate where subsidies are most needed based on participatory rural connectivity diagnostics. Early movers on formalised ESG adoption can gain from burnishing social licenses to operate, differentiating regulatory incentives, and innovative embryonic models, including solar-powered net zero sites with free rural access packages (Linnenluecke, 2022).

Promoting inter-operator infrastructure sharing is a vital starting point for policymakers and regulators overseeing rural connectivity objectives through exemptions from competition regulations around jointly-funded builds serving public aims (Huang, 2021). Through transparency measures like online tracking systems, organised payment tranches, and mobilising community oversight mechanisms, administrative improvements for universal service funds also remain vital to balance financial controls against delays (Ebrahimi & Koh, 2021). Driving regional harmonization efforts around licensing policy, spectrum planning, and open access models via bodies like SADC can spur pooled investment across borders otherwise deterred by discontinuities (Mooneeapen et al., 2022). By combining institutional capacities and assets from both the public and private sectors, intentional public-private partnerships also present an excellent cooperative alternative (Myovella et al., 2021). Still, institutionalising rigour and rural community involvement around needs assessments and performance monitoring is crucial to ensure that such collaborations remain sensitive to on-ground reality rather than bureaucratic presumptions. With corporations placing growing strategic emphasis on social charter elements within ESG orientation, regulators can institute frameworks mandating and encouraging digital inclusion targets within mainstream commercial activities of licensees (Lim et al., 2022). Improvements in rural access, however, should be quantified instead of accepted at face value.

Finally, underprivileged rural communities experiencing connectivity gaps must organise to express priorities, offer intelligence on real-world shortcomings, and monitor results from programs meant to remove access constraints (Kormos & Wisdom, 2021). This calls for proactive information flows between citizens, ward councils, operator forums, and policy bodies addressing locally specific issues, suggested remedies, implementation, and monitoring. Only grassroots-sourced diagnostics can inform fitting context-specific and sustainable remedies from diverse initiatives now emerging.

6 Value of Research

This research offers significant theoretical and practical contributions regarding business models, partnerships and policy mechanisms for sustainably overcoming rural connectivity divides, particularly in developing countries like Zimbabwe grappling with affordability, awareness, infrastructure, inclusion, and other adoption gaps.

Theoretically, the paper expands knowledge of coordinated multi-stakeholder approaches balancing financial, capacity, and governance inputs, respectively, from private mobile operators, public authorities, and rural communities to drive inclusive digital transformation. It offers rare empirical data from a Sub-Saharan country highlighting financially sustainable infrastructure sharing models justified by policy concessions and investor partnerships (Mooneeapen et al., 2022). Researchers investigating coordinated governance mechanisms to incentivise connectivity spanning underdeveloped cross-country zones also find relevance in the insights on regional harmonisation of licencing and spectrum regimes actively being pursued by entities like SADC (Sharma et al., 2023). Furthermore, study of recent administrative changes and monitoring structure for Zimbabwe's Universal Service Fund helps scholars discuss how best to maximise such financial instruments widely used in developing nations for effective rural access results instead of just distribution flows. Results exposing apparent shortcomings and community responsibility solutions unite academic knowledge of participative budgeting and performance monitoring as vital to prevent elite state capture. Through stressing multi-layered collaborative dynamics between operators, regulators, and villagers in addressing barriers rooted in awareness, affordability, sustainability, skills, and trust, the research responds to demands for careful unpacking of socio-technical dimensions necessary for lasting digital inclusion.

Practically, the business models and partnership approaches elucidated offer transferable insights to structure viable connectivity solutions tailored for rural viability across developing markets beset by income constraints and uneven infrastructure. The research mainly helps operators size LEO satellite solutions against terrestrial builds, negotiate infrastructure sharing models within maturing policy environments, and integrate social objectives strategically under ESG orientation for enabling rural coverage. Similarly, for governments and regulators, the emphasis on administrative rigor for universal access funds, inter-agency linkages, and formalizing social partnerships provides a toolkit of structured mechanisms for upholding rural access commitments by market players. The findings will specifically assist Zimbabwean authorities in framing new legislation on service licensing, evaluating subsidy allocation procedures, coordinating regional infrastructure projects, and monitoring operator performance. Most crucially, the paper consolidates an agenda for infusing transparency and community-driven monitoring to make interventions respond to citizen preferences rather than bureaucratic assumptions alone. Hence, it teaches institutions across sectors looking to enhance accountability mechanisms. Therefore, by gleaning insights from multi-stakeholder strategies adopted proactively in the understudied context of digital gaps in Zimbabwe, the research offers practical takeaways to stimulate universal, affordable, and sustainable connectivity across the rural global south within financially viable frameworks.

7. Conclusions

As the study suggests, Zimbabwe boasts encouraging examples of operators coordinating around joint access infrastructure, public administrators reforming machinery to improve rural allocation efficiencies, and cybertribe linkages bringing citizen feedback onto the policy radar. Yet, optimizing these dispersed collaborative elements into an integrated mission to connect the country's rural population globally and use connectivity for income growth will need strengthening mutual commitments between all parties. Targeting transparency in public interventions like universal service funding and enabling user-centric monitoring to inform community-appropriate innovation, what emerges for replication is a framework knitting together financial sustainability and social responsibility across private network rollouts. Stakeholders have a unique window to jointly shape an enabling structure where rural access improvements become a shared national priority irrespective of where particular solutions emerge from. Adapting models like low-orbit satellite broadband, which is still in evolutionary stages, enables this. The research provides extensive empirical analysis on this new multi-actor rural connectivity paradigm within an under-represented Sub-Saharan setting, thereby extracting transferable lessons for fair and inclusive digital transformation strategies all around the global south.

Author Contributions: The author conducted Primary research as a requirement for his doctoral degree at Africa Research University. The manuscript is from an unpublished research —Prosper Mutswiri.

Funding: The author affirms they did not receive any outside funding, grants, or other support for creating this publication.

Acknowledgments: The authors thank Africa Research University for approving their study, as this is an extract from a PhD Thesis.

Conflicts of Interest: The authors declare no conflicts of interest.

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