SELF-SUSTAINING FINANCING SOLUTIONS FOR COMMUNITY CONNECTIVITY

Official Outcome of the UN IGF Dynamic Coalition on Community Connectivity

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Edited by *Carlos Rey-Moreno*, *Luca Belli* and *Senka Hadzic*

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PREFACE

The Internet is for Everyone

In the Chaco region of South America, a group of women of the Nivaclé people work every day surrounded by carob pods, sorting the fruit destined to become the flour they sell to maintain their livelihoods. Once dependent on intermediaries to reach distant markets, they now post their goods on social media and take online orders directly from cafés and shops in Paraguay's capital city of Asunción. This quiet transformation began with connectivity, but what may seem trivial to most only happened in 2023, after they got together to build their community network.

In an era where Internet connectivity defines opportunity, livelihoods, and innovation, the stark reality that over 2.6 billion people remain offline is a sobering reminder of persistent global inequity. This is especially the case for Indigenous populations, displaced people, and women, who face many facets of inequality and could benefit from the opportunities the Internet offers the most.

The Internet Society's 2030 Strategy positions itself as a beacon of change, underscoring a vital truth: access to the Internet is no longer a luxury—it is a fundamental right and a critical enabler of social and economic development.

At the heart of these frameworks lies the vision of an Internet for everyone. One that is open, globally connected, secure, and trustworthy. Our work to connect the unconnected is a cornerstone of this mission. We champion connectivity that is centered in communities and driven by them because this is how we can address the multifaceted barriers—economic, geographic, and political—that perpetuate the digital divide. Community networks, in particular, represent a powerful model for inclusive access: networks built by communities, for communities. They prioritize local expertise and empower individuals to design and manage their own connectivity solutions, thus ensuring that technology is tailored to their unique social, cultural, and economic contexts.

Complementing this is the Internet Society's Connectivity Co-Funding Initiative, a collaborative financing model that brings together governments, private-sector actors, philanthropic organizations, and local communities. By pooling resources and technical expertise, this initiative seeks to unlock funding for infrastructure deployment, provide technical training, and advocate for policy environments that support grassroots innovation. It is not merely about laying cables or installing towers—it is about investing in human potential, nurturing local leadership, and fostering sustainable economic growth.

The IGF 2025 session titled "Financing Self-Sustaining Community Connectivity Solutions" offered a dynamic forum for exchanging ideas and forging partnerships. It brought together a diverse spectrum of voices: policymakers, community network operators, researchers, and private-sector innovators. The session illuminated the financial and regulatory challenges communities face to establish connectivity—such as access to affordable spectrum, licensing hurdles, and the sustainability of community-led models. Importantly, it also showcased successful examples of self-sustaining networks that have thrived through local ownership and cooperative governance structures.

This book is both a product of and a companion to that conversation. It explores in great depth the challenges and opportunities surrounding community connectivity, with a particular focus on the financial models and policy frameworks that can unlock self-sustaining growth. Through compelling case studies, it illustrates how community-led networks—from rural Africa to remote regions of Asia and Latin America—have successfully leveraged cooperative models and public-private partnerships to extend the Internet's reach. It also examines the crucial role of international cooperation and multistakeholder engagement in ensuring that these networks are technically viable, economically resilient, and socially empowering.

As we look to 2030, the need for innovative, inclusive connectivity models is more urgent than ever. Global crises—from pandemics to climate change—have underscored how essential the Internet is for education, healthcare, commerce, and civic participation. Community networks and the initiatives supporting them offer a blueprint for a more equitable digital future: one where connectivity empowers individuals to shape their own destinies.

This book is an invitation to join that movement. It is a call to action for governments to create enabling policies, for donors and private actors to invest in sustainable models, and for local communities to recognize their own power to bridge the digital divide. Most importantly, it is a testament to the transformative potential of collective action. Together, we can ensure that no community is left behind, that every voice has the chance to be heard, that every story has the opportunity to be shared, and that every individual has the power to connect to a brighter future.

Sally Wentworth
President & CEO, Internet Society and
Internet Society Foundation

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The Local Networks (LocNet) initiative is a collective effort led by APC and Rhizomatica in partnership with people and organisations in the global South to directly support Community networks and to contribute to an enabling ecosystem for their emergence and growth.

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INTRODUCTION

Community Connectivity: Towards Self-Sustaining Financing Solutions

Carlos Rey-Moreno, Luca Belli and Senka Hadzic

Community Networks (CNs) are connectivity initiatives usually developed in a bottom-up fashion by groups of individuals – i.e., communities – that may contribute to the design, development and management of the network infrastructure as a common resource. Hence, CNs are usually managed according to the governance models established by their community members and may be operated by groups of self-organised individuals or entities such as non-governmental organisations (NGOs), local businesses or public administrations.

Since 2016 the Dynamic Coalition on Community Connectivity (DC3) of the United Nations Internet Governance Forum (IGF) has fostered thriving multistakeholder debates dedicated to the analysis of community connectivity.[1] DC3 is a multistakeholder group coordinated by Prof Belli and Dr Hadzic, aimed at fostering a collaborative analysis of community connectivity initiatives, exploring how they can improve and expand connectivity, analysing their technical features, and their governance and funding models. DC3 provides a shared platform involving all interested individuals and institutions into a multistakeholder analysis of community connectivity issues. This book is the Official 2025 Outcome of the UN IGF DC3 and should be seen as a further step towards a better understanding of community networking and is built upon the previous efforts of the DC3[2].

Over the past decade, the CNs debate has evolved considerably, and the discourse surrounding these initiatives has undergone significant transformation. This evolution reflects a shift from grassroots technical

1 Detailed information about tDC3 can be accessed on its dedicated webpage on the IGF website https://www.intgovforum.org/en/content/dynamic-coalition-on-community-connectivity-dc3-0 as well as on the DC3 website https://comconnectivity.org/.

2 All DC3's Outputs since 2016 are available on the IGF website as well as on the DC3 dedicated website. See *supra* n (1).

experimentation to the recognition of CNs as essential instruments for digital inclusion, sovereignty, and cybersecurity, all underpinned by sustained community engagement. In this context, DC3 has systematically studied the conceptual, regulatory, and operational frameworks for CNs through a rights-based, community-centric approach. As we will recount in the next section, understanding how the community connectivity debate has evolved is, therefore, essential to understand why the identification of self-sustaining financial solutions is probably the most important issue to be addressed and why such solutions may have a remarkably relevant impact for the future of connectivity.

1. Understanding where we came from to knowing where we are heading to

The initial phase of DC3's work, as documented in its 2016 Outcome Report, *Community Connectivity: Building the Internet from Scratch*, positioned CNs as a democratising force in internet access.[3] At a time when traditional telecommunications models started to fail to serve remote and marginalized populations, DC3 articulated CNs as social, legal and technical constructs enabling communities to exercise agency over connectivity.

The 2017 *Declaration on Community Connectivity* formalized this vision, asserting principles such as network neutrality, open infrastructure, and local ownership. These principles were not abstract ideals but rooted in participatory governance models, as evidenced in the landmark publication Community networks: the Internet by the People, for the People. In this volume, for the first time was presented the concept of "network self-determination"[4], a concept

3 See Belli (Ed.) (2016). Community Connectivity: Building the Internet from Scratch Annual Report of the UN IGF Dynamic Coalition on Community Connectivity https://www.intgovforum.org/en/filedepot_download/4391/1163.

4 The concept is defined by Belli as "the right to freely associate in order to define, in a democratic fashion, the design, development and management of network infrastructure as a common good, so that all individuals can freely seek, impart and receive information and innovation". See: Luca Belli (2017). Network Self-Determination and the Positive Externalities of Community Networks. The idea of network self-determination is based on the consideration that well-functioning network infrastructure on affordable and nondiscriminatory terms facilitates significantly the full enjoyment of every person's fundamental rights. Indeed, as Internet users we can easily access information, knowledge and education, but also utilise connectivity to become entrepreneurs, share the fruit of our creativity and conduct (digital) businesses, and have access to an increasing number of digitalised public services, ranging from paying taxes to applying to schools and housing opportunities of receiving remote medical consultations.

that will become a key pillar of subsequent debates on "good digital sovereignty"[5], where CNs are a telling example of grassroot digital sovereignty, where local communities understand, develop and self-regulate digital technologies according to their own value and for their own benefits.[6]

Central to this phase was the coalition's emphasis on community engagement as both a methodology and an objective. By convening multistakeholder dialogues at global forums like the IGF, DC3 ensured that underrepresented voices—particularly from the Global South—shaped policy recommendations, illustrating how local stakeholders navigated regulatory barriers to deploy networks. This participatory approach challenged top-down policymaking, advocating instead for legal frameworks that recognised CNs as legitimate actors under telecommunications law.

As CNs gained traction, DC3's focus expanded to address systemic barriers to scalability and sustainability. On the one hand, the *Community Network Manual* (2018) provided a collaborative guide co-developed with practitioners, aimed at offering step-by-step guidance on how to build and to operationalise CNs.[7] On the other hand, the 2019 DC3 Outcome Report on "Building Community Networks: A Collaborative Governance Towards Enabling Frameworks" stressed the importance of considering CNs from a regulatory perspective and provided guidance on how to do so in an effective way.[8]

These analyses catalyzed regulatory reforms, such as Brazil's National Telecommunications Agency (Anatel) exempting CNs from licensing fees in 2021—a direct outcome of DC3's advocacy for asymmetric regulation tailored to community needs. Meanwhile the need for

5 Belli L. Building Good Digital Sovereignty through Digital Public Infrastructures and Digital Commons in India and Brazil. G20's Think20 (T20). 2023. https://t20ind.org/research/building-good-digital-sovereignty-through-digital-public-infrastructures/.

6 Belli, L., & Hadzic, S. Community Networks: Building Digital Sovereignty and Environmental Sustainability. Official Outcome of the UN IGF Dynamic Coalition on Community Connectivity. 2023.https://is.gd/cB2VLm ; Jiang, Min and Belli, Luca (Eds). Digital Sovereignty from the BRICS Countries: How the Global South and Emerging Power Alliances Are Reshaping Digital Governance. Cambridge University Press. 2024. https://doi.org/10.1017/9781009531085.

7 Belli, L. (Ed.). (2018). The community network manual: how to build the Internet yourself. Official Outcome of the UN IGF Dynamic Coalition on Community Connectivity. https://www.intgovforum.org/en/filedepot_download/4391/2376.

8 Belli, L. (Ed.). (2019). Building Community Networks: A Collaborative Governance Towards Enabling Framework. Official Outcome of the UN IGF Dynamic Coalition on Community Connectivity. https://www.intgovforum.org/en/filedepot_download/4391/1901.

creative thinking to solve pressing connectivity issues became a global priority during the COVID-19 pandemic, as clearly illustrated by the 2020 report, on *The Value of Internet Openness in Times of Crisis*.

Sustainability emerged as a critical theme during this period. The 2021 study, *Community Networks: Towards Sustainable Funding Models*, dissected economic viability, advocating for hybrid financing mechanisms that blended public grants, community contributions, and cross-subsidies. However, this reflection was far from completed and, in fact, only started with the 2021 report, which is completed by this new 2025 report, based on empirical evidence and research developed over the past years.

Crucially, DC3 framed sustainability not merely as a financial imperative but as a legal obligation for states under international human rights law. This is indeed one of the cornerstones of what we have referred to as network self-determination, which derives its juridical foundation from the fundamental right to self-determination, a peremptory norm (jus cogens) articulated in Article 1 of both the ICCPR and the International Covenant on Economic, Social and Cultural Rights (ICESCR), as well as Article 1(2) of the Charter of the United Nations. These instruments collectively establish that "all peoples possess the right to self-determination," entitling them to "freely determine their political status and pursue their economic, social, and cultural development." Signatory states, pursuant to Article 1(3) of the Covenants, bear obligations to "promote the realization of this right," thereby embedding self-determination as a cornerstone of international legal order.

CNs operationalise this normative framework by enabling communities to exercise self-determination in its most direct form: the autonomous governance of connectivity infrastructure. Such networks facilitate the collective enjoyment of the right to free development of personality, as articulated in Article 22 of the Universal Declaration of Human Rights (UDHR), permitting communities to determine their sociotechnical trajectories. This includes the capacity to design, deploy, and manage network architectures tailored to local exigencies, thereby advancing socioeconomic development through context-specific technological and applicative solutions. The participatory governance inherent to CNs ensures that infrastructure aligns with

communal priorities, fostering digital environments wherein users assume dual roles as both consumers and producers ("prosumers") of content, services, and innovation.

This dynamic disrupts centralised models of internet governance, countering the oligopolistic concentration endemic to the digital ecosystem. By decentralizing innovation, CNs empower marginalized populations to craft solutions addressing localized challenges, thereby enhancing political, economic, and social agency. Such decentralization aligns with the subsidiarity principle in international law, which prioritizes decision-making at the most immediate level of community organization. Consequently, CNs not only fulfill individual and collective rights under Article 1 of the ICCPR and ICESCR but also advance the broader objectives of digital inclusion and equitable access enshrined in instruments such as the UN Sustainable Development Goals (SDGs)[9].

Hence we can argue that, in juridical terms, the establishment of CNs constitutes a legitimate exercise of the right to self-determination, as it enables communities to "freely pursue… economic, social, and cultural development" through self-organized connectivity. States, in adhering to their obligations under international law, must refrain from erecting regulatory barriers to such initiatives and instead adopt enabling frameworks—e.g., spectrum allocation, fiscal incentives, and capacity-building programs—that operationalize Article 1(3) of the Covenants. Failure to do so may constitute a violation of positive obligations to "respect, protect, and fulfill" the right to self-determination, particularly where centralized infrastructure perpetuates digital exclusion.

Thus, CNs represent both a manifestation of and a mechanism for realizing self-determination in the digital age. By democratising infrastructure governance, they transform connectivity from a commodified service into a collective right, thereby recalibrating power dynamics within the internet ecosystem. This realignment not only mitigates risks of digital colonialism but also fosters pluralistic innovation, ensuring that technological progress reflects the diverse

9 Notably, Goal 9 establishes the United Nations members' commitment to "build resilient infrastructure, promote sustainable industrialization and foster innovation." See https://www.un.org/sustainabledevelopment/infrastructure-industrialization/.

needs and aspirations of global communities. These are some of the considerations why the DC3 2022 annual report emphasized that CNs must be seen as enablers of human rights[10].

These considerations have been embedded in the most recent phase of DC3's work, reflecting a maturation of the CN debate, intertwining connectivity with broader themes of digital sovereignty and cybersecurity. The 2023 Outcome Report, *Building Digital Sovereignty and Environmental Sustainability*, redefined sovereignty not as state-centric control but as community self-determination.[11] Case studies from Mexico's Indigenous networks and Kenya's Community Networks Licensees demonstrated how CNs mitigate dependencies on foreign tech corporations.

Lastly, cybersecurity became a focal point in DC3's 2024 initiatives. The *Securing the Commons* report addressed vulnerabilities in CNs fostering the adoption of community-designed protocols, such as decentralised identity systems and end-to-end encryption tailored for low-bandwidth environments.[12] This approach rejected monolithic security standards, instead advocating for adaptive frameworks that respect local contexts—a stance consistent with the proportionality principle in international human rights law.

Over the past decade, DC3 has redefined the CN debate from a niche technical discussion to a multifaceted legal and policy agenda. Its success lies in consistently centering community engagement as both a means and an end. By fostering multistakeholder coalitions, DC3 has influenced regulatory reforms that recognize CNs as lawful entities, while its technical guides have empowered communities to assert their rights to connectivity.

In this regard, the DC3 work underscores a fundamental truth: sustainable digital inclusion cannot be achieved through infrastructure alone. It requires legal frameworks that institutionalize community

10 Belli, L., & Hadzic, S. (Eds.) (2022). Community networks as enablers of human rights. Official outcome of the UN IGF dynamic coalition on community connectivity. www.intgovforum.org/en/filedepot_download/45/24008.

11 Belli & Hadzic (2023). See supra n (6).

12 Belli, L., & Hadzic, S. (Eds.) (2024). Cybersecurity in Community Networks: Securing the Commons Official outcome of the UN IGF dynamic coalition on community connectivity. https://intgovforum.org/en/filedepot_download/45/28450.

agency, participatory governance models that bridge local and global policymaking, and security protocols that protect without paternalism. In this trajectory, DC3 has not merely documented the evolution of CNs but has actively shaped it, proving that when communities lead, connectivity becomes more than a service—it becomes a right.

2. A pragmatic and honest approach to financial sustainability

It has increasingly been recognized in many internet governance fora, including the IGF, that community connectivity initiatives play a role in closing the connectivity gap. Most recently, the Global Digital Compact, adopted by the United Nations, included the commitment to invest in local networks as a way to address persistent digital exclusion. However, creating financing mechanisms to address the needs of these types of initiatives has been a challenge dating back to World Summit On Information Society (WSIS), and little progress has been made to date.

Part of the problem has resulted from reliance on traditional telecommunication operators to close the digital divide, which in turn is reflected in policy and regulatory frameworks designed for their national scale and centralised ways of operating. Similarly, most financial instruments available are designed for these large operators and their multimillion-dollar telecommunication infrastructure projects. One example are Universal Service Funds, which are typically designed in a way that only traditional telecommunications operators can access them. Developing new strategies that can close the digital divide by addressing the gaps where these operators cannot meet their return on investment targets, requires exploring innovative financial solutions that can be made available to community connectivity and other local initiatives.

These strategies can be leveraged by community connectivity providers to position them for receiving blended finance and other innovative financial mechanisms that multilateral and national development banks, and other members of the finance community, could make available to close the large and persistent digital divides

that continue to underscore the difficulties of achieving the goal of universal access.

However, one has to honestly and pragmatically acknowledge that establishing sustainable CNs may present considerable challenges. As discussed in the 2021 DC3 output, community connectivity initiatives have traditionally largely relied on international aid to fund the infrastructure they require. While CNs have demonstrated their capacity to bridge digital divides and foster local empowerment, their long-term viability is frequently undermined by precarious and fragmented funding streams.

A primary obstacle is the limited access to predictable and diversified sources of capital. Many CNs rely heavily on sporadic grants, donations, or short-term project funding, which are inherently unstable and often tied to donor priorities rather than community needs. This dependence impedes the ability to engage in strategic planning, invest in infrastructure upgrades, or retain skilled personnel.. Furthermore, as previous DC3 work has highlighted, regulatory frameworks often exacerbate these difficulties.

To address these challenges, this volume aims at providing the readers with a deeper understanding of alternative approaches to achieving self-sustainability in community connectivity initiatives. Such understanding is necessary because traditional funding mechanisms often fail to understand, and therefore, address the unique economic, social, and operational contexts of these networks. Given the limited economies of scale, higher operational costs in remote areas, and the reliance on volunteer labor and donated resources, community networks require innovative, context-sensitive financial models that can ensure long-term viability without compromising their community-centered nature.

This volume presents novel research and discusses community connectivity initiatives as contributors to the social and solidarity economy (SSE). Given their long tradition and ecosystem of partners and funders in other sectors that have managed to address those challenges, takeaways are unique insofar it will be the first time such a lens is applied to community connectivity providers.

3. The persistent digital divide

According to the International Telecommunication Union (ITU), nearly a third of humanity has never used the internet[13]. Additionally, there are significant gender and geographical imbalances. It is estimated that 70% of men are connected to the internet, while only 65% of women are[14]. In low-income countries, only 16% of people living in rural areas and 33% of those in urban areas use the internet[15].

Traditional profit-seeking models have proven fundamental to providing the connectivity the world experiences today, where most upper and middle income groups are able to participate meaningfully in the digital economy, however they have failed to offer meaningful connectivity to those with lower incomes in rural, remote, and underserved areas. Even with public funds channeled through traditional Universal Service Fund (USF) models to improve operators' return on investment, a business case for these operators to offer affordable, uncapped high-speed services in areas with low average revenue per user (ARPU) remains absent.

Even where sufficient numbers of users exist to justify the infrastructure investment, statistics from GSMA, the association representing mobile operators globally, show that in rural areas,traditional operators are only able to provide traffic-capped mobile data services, which are unaffordable for the general population in those areas: a mobile broadband subscription with a 1.5 GB data package costs less than 2% of gross national income (GNI) per capita – the ITU affordability target – in only four LDCs[16]. Therefore, despite progress in achieving universal meaningful connectivity, a persistent digital divide prevents this goal from being fully realized.

As the recent ITU Digital Infrastructure Investment Initiative report (launched in coordination with Brazil's G20 presidency) indicates, "*for individuals in these locations to benefit from meaningful connectivity, stakeholders should think beyond the typical profit-seeking business*

13 International Telecommunication Union. *ICT Indicators for the Monitoring of the Digital Divide (2024)*. Geneva: ITU, 2024. https://www.itu.int/dms_pub/itu-d/opb/ind/d-ind-ict_mdd-2024-4-pdf-e.pdf.

14 Ibid.

15 Ibid.

16 Shanahan, M., & Bahia, K. (2023). Op. cit.

plan"[17]. Despite this evidence, and calls such as those from ITU Secretary-General Doreen Bogdan-Martin, which have stressed that achieving meaningful universal connectivity requires moving beyond "*business as usual*,"[18] most solutions to close the persistent digital divide continue to focus on incentivizing large commercial investors to finance connectivity gaps with traditional solutions.

4. Community Connectivity as a powerful ally

In this context, community-centred connectivity providers are emerging as important complements to expanding access to the unconnected. Unlike traditional operators, these providers are driven by different investment priorities rooted in local and regional needs. They can be thriving small or medium businesses, non-profits, community organisations, or cooperatives. They originate from within local communities to address local connectivity needs, but they often also provide content and capacity development.[19] They are the result of people working together, combining their resources, and connecting themselves to close connectivity gaps. Some are small in scope, serving communities of fewer than 3,000 people, but some serve much larger communities, or more than one village or community.[20]

To promote universal digital inclusion, the market needs to be diversified with a variety of players: corporate, local, and non-profit. Local community-centred small, medium and micro enterprises (SMMEs) are particularly good at reaching the otherwise marginalised, with examples from many countries.[21] These solutions offer unique advantages. For example, they can begin on a small scale and

17 International Telecommunication Union. *Digital Infrastructure Investment Initiative*. Geneva: International Telecommunication Union, 2025. https://www.itu.int/hub/publication/s-dii-diii-whitepaper-2025/.

18 International Telecommunication Union. *Connecting Humanity: Assessing Investment Needs of Connecting Humanity to the Internet by 2030*. Geneva: International Telecommunication Union, 2020. https://www.itu.int/hub/publication/d-gen-invest-con-2020/.

19 Leandro Navarro (Ed.) Report on Existing Community Networks and their Organization. 2016.; Luca Belli (Ed). Community Networks: The Internet by the People, for the People. 2017; GISWatch. Global Information Society Watch 2018: Community Networks. 2018.

20 For further illustrations and examples, see https://www.internetsociety.org/issues/community-networks/success-stories/.

21 Rey-Moreno, C. (2024, 10 December). *Typology of community-centred connectivity initiatives*. Association for Progressive Communications and Rhizomatica.

incorporate a variety of ownership and operating models that ensure financial sustainability. They range from networks which are fully deployed and operated by community organisations, to those set up by social enterprises, cooperatives and local governments where community members participate at different stages of the telecommunications infrastructure value chain[22]. This, in turn, contributes to the cost-effectiveness of these solutions to provide meaningful connectivity.[23]

These initiatives are already part of the ecosystem of SMMEs that are the lifeblood of many economies, especially in the developing world, but which have failed to receive the support and attention they deserve in a sector typically dominated by anywhere between two and four national carriers per country. As SMMEs themselves, they also play a catalytic role in the local economic ecosystem as they enable and support other SMMEs through the provision of access to connectivity and skill-building. This has the impact of strengthening SMMEs (e.g. through access to information, market reach and knowledge, efficiency tools, better access to e-government, etc.).

Additionally, community-centred connectivity providers promote broader participation from diverse community members to address needs that extend beyond internet access. This includes building digital skills and creating culturally relevant, local digital content. The social inclusion and transformational nature of these additional services significantly increase their social return of investment, and so they contribute to other Sustainable Development Goals (SDGs) beyond those related to internet access alone. Local access networks are local interventions that integrate supply-side and demand-side of internet access.

Recognition of these initiatives has recently grown, reflected in the OECD Council's Recommendation on Broadband Connectivity[24],

22 Rey-Moreno, Carlos; Greene, Laina Raveendran and Jensen, Mike. "Innovative Financing Mechanisms to Bridge the Digital Divide." In *Global Information Society Watch 2024 Special Edition: WSIS+20: Reimagining Horizons of Dignity, Equity and Justice for Our Digital Future*, 52–62. Johannesburg: Association for Progressive Communications, 2024. https://www.giswatch.org/sites/default/files/GS2024-carlos-greene-jensen.pdf.

23 https://academy.itu.int/training-courses/full-catalogue/universal-service-financing-efficiency-toolkit.

24 Organisation for Economic Co-operation and Development (OECD). *Recommendation of the Council on Broadband Connectivity*. OECD, June 10, 2021. https://legalinstruments.oecd.org/en/instruments/OECD-LEGAL-0322.

and ITU resolutions at the World Telecommunications Development Conference[25] and at the Plenipotentiary Conference[26], and in the T20 policy recommendations by the Indonesian[27] and Brazilian[28] G20 presidencies. Similarly, the Global Digital Compact includes a commitment to invest in "local networks" to close digital divides[29], and many Multilateral Development Banks[30] [31], as well as the Broadband Commission[32] recommend establishing innovative financing and investment models for community-centred operators to catalyze their impact.

However, despite this greater recognition, and enabling policies in certain countries, the discussions among policymakers, development experts, philanthropy, and corporations too often focus on how much money is needed and not enough on how money needs to be used differently. Practical tools have been created to provide a foundation of understanding for funders and social impact investors about what community connectivity providers look like[33], their various ownership and operating models, and how they can be financed sustainably. Still, more granularity in relation to the solutions is required and this is precisely what we have aimed to accomplish with this volume.

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25 Resolution 37: Bridging the digital divide, International Telecommunication Union. *World Telecommunication Development Conference (WTDC-22): Final Report*. Geneva: ITU, 2022. https://www.itu.int/dms_pub/itu-d/opb/tdc/D-TDC-WTDC-2022-PDF-E.pdf.

26 Resolution 139: Use of telecommunications/information and communication technologies to bridge the digital divide and build an inclusive information society, International Telecommunication Union. ***Final Acts of the Plenipotentiary Conference (Bucharest, 2022)***. Geneva: ITU, 2022. http://handle.itu.int/11.1002/pub/81da0d1c-en.

27 Think20 Indonesia. *T20 Communiqué Indonesia*. Jakarta: Think20 Indonesia, 2022. https://t20southafrica.org/wp-content/uploads/2024/12/T20-Communique-Indonesia.pdf.

28 CEBRI, IPEA, and FUNAG. *T20 Brasil: Communiqué and Implementation Roadmaps*. Rio de Janeiro: CEBRI, 2024. https://t20southafrica.org/wp-content/uploads/2024/12/T20_Communique_Brasil.pdf.

29 United Nations. *Global Digital Compact*. United Nations, 2024. https://www.un.org/digital-emerging-technologies/global-digital-compact.

30 García Zeballos, A., et al. (2021). Development of National Broadband Plans in Latin America and the Caribbean. InterAmerican Development Bank. https://publications.iadb.org/en/development-national-broadband-plans-latin-america-and-caribbean.

31 Brewer, J., Jeong, Y., & Husar, A. (2022). Last Mile Connectivity: Addressing the Affordability Frontier. Asian Development Bank. https://www.adb.org/publications/last-mile-connectivity-affordability-frontier.

32 United Nations Broadband Commission for Sustainable Development. *21st Century Financing Models: Broadband Commission*. 2021. https://broadbandcommission.org/wp-content/uploads/dlm_uploads/2021/11/21st-Century-Financing-Models-Broadband-Commission.pdf.

33 Connectivity Capital. *Financing Mechanisms for Locally Owned Internet Infrastructure*. Association for Progressive Communications, 2021. https://www.apc.org/sites/default/files/financing-mechanisms-for-locally-owned-internet-infrastructure.pdf.

5. What you will find in this book

The first chapter titled "Typology of community-centred connectivity initiatives", Carlos Rey-Moreno offers a comprehensive exploration of the diverse landscape of Community-Centred Connectivity Initiatives (CCCIs), drawing upon the typology developed by the Association for Progressive Communications (APC). This typology categorizes CCCIs based on organizational structures, technological approaches, and community engagement models, reflecting the rich variety of initiatives that have emerged globally. By moving beyond a one-size-fits-all definition, the chapter highlights how CCCIs are tailored to meet specific local needs, cultural contexts, and availability of resources, emphasizing their role in addressing the digital divide through community-driven solutions.

In their chapter "Towards Measuring the Social Impact and Cost Effectiveness of CCCIs: Insights from Case Studies in Asia and Africa" Marie Lisa Dacanay, Albert Teo and Jay Lacsamana embarked on case study research among what may be considered as significant practices among community connectivity initiatives in Asia and Africa. The overall objective of the study was to articulate the social impact of CCCIs using development indexing (DI) as a tool and their cost effectiveness aided by the methodology of social return on investment (SROI). The case studies showed that community connectivity initiatives provide social inclusion services and transformational services that generate significant social impacts beyond what commercial ISPs can offer, hence clearly demonstrating the value proposition for investing in CCCIs. As such, the SROI ratios over three years involving the cases studied were all above one and also had an upward trend every year, which demonstrates a consistent increase in social value created by these CCCIs over time.

Overall, the cases demonstrate that community connectivity initiatives are not only cost-effective interventions in bridging the digital divide but significantly contribute to accelerating the achievement of many of the sustainable development goals as indicated by the multifaceted key result areas where significant impact in terms of depth and/or scale was observed. These results will hopefully inspire

social impact investors to consider funding this type of initiatives to meet their foundational goals.

In their chapter “Breaking the financial divide of digital divide” Claude Dorion, Richard Giroux and Dominique Lesaffre delve into the unique financial landscape of Community-Centred Connectivity Initiatives (CCCIs), shedding light on their challenges, needs, and promising role as agents of digital inclusion. Despite their proven social impact, CCCIs face a persistent financial divide due to the capital-intensive nature of connectivity infrastructure and their commitment to economic accessibility over investor profit. The findings underscore the crucial need for innovative financing models, blended financial solutions, and robust technical assistance to unlock the full potential of CCCIs as agents of digital inclusion.

This chapter situates CCCIs within the broader framework of the Social and Solidarity Economy (SSE), drawing attention to the significant policy momentum surrounding SSEs globally, increasingly recognized by multilateral bodies, including the United Nations. Ultimately, this chapter offers a roadmap for navigating the financial divide that CCCIs face, pointing to the transformative potential of impact investing and ecosystem-building in driving equitable digital access and fostering inclusive economic development.

In their chapter “Investment Committee Review of Community Networks in the Global South” Nathalia Foditsch, Erica Mesker and Brian Vo, apply Connect Humanity’s Investment Risk Framework to assess the viability and impact potential of broadband investments across nine community connectivity initiatives in the Global South. They do so across five key dimensions: Network Technical Risk, Community Engagement, Business Model Strength, Legal & Compliance, and Portfolio Impact. Each dimension is evaluated through specific subfactors and assigned a numerical score where lower scores indicate lower risk. Through their analysis they observe that while community connectivity initiatives are not without risk, they offer meaningful connectivity, local ownership, and social returns unmatched by commercial ISPs. Therefore, they point out that a financing opportunity to close the global digital divide is real, but unlocking it requires patient capital, risk-aligned

instruments, and stronger operational readiness across the board, and recommend a programmatic approach that pairs small-scale, milestone-based financing with technical assistance and flexible repayment structures as the best positioned to meet the sector where it is and move it toward scalable, investable maturity. They conclude that a tailored, blended finance approach, with strong pipeline support and risk mitigation, can unlock scalable investment in this sector.

A concluding chapter by Mike Jensen, Josephine Miliza and Anriette Estherhuysen ends this volume. In the chapter, they articulate the six key elements that have emerged from the experience of the APC-Rhizomatica LocNet initiative[34] working with community-centred connectivity providers, policy makers and regulators since 2017, to ensure an enabling financial and regulatory environment for community-centred connectivity initiatives. These elements include: 1) Deepen insight into the value of a diversified ecosystem; 2) Reduce the regulatory requirements for these providers; 3) Adopt innovative mechanisms to allow community-centred connectivity providers access to radio frequency spectrum that is either unused or unassigned in underserved areas; 4) Ensure affordable access to backhaul networks; 5) Raise awareness and build capacity; and 6) Establish innovative financing and investment models.

It is precisely in the latter that the findings presented in this volume reveal that CCCIs deliver strong social returns and align with sustainable development objectives from impact and other socially driven investors This reinforces the requirement for patient, risk-aligned capital, innovative blended finance strategies, and robust non-financial support to close the financial divide that limits CCCIs growth. It concludes with the recommendation that by fostering an enabling ecosystem and investing in CCCIs' unique strengths, stakeholders can accelerate progress toward a more inclusive, connected, and resilient digital future.

34 Association for Progressive Communications. *Digital Inclusion*. Accessed April 2, 2025. https://www.apc.org/en/our-work/themes/digital-inclusion.

We hope this report will contribute to creating more bridges between a finance community looking for solutions to close the persistent digital divides and all those community connectivity initiatives struggling to access capital. Translating these bridges into tangible and operationalizable financial instruments can ensure that community connectivity initiatives can thrive, close the digital divide and bring the benefits of connectivity to everyone, everywhere.

1 Typology of community-centred connectivity initiatives

Carlos Rey-Moreno

1.1 Preamble

The term "community network" has become something of a catch-all description of a wide range of telecommunication networking activities at the community level that have emerged over the last several years. The organisational form, scale and priorities of those emerging models can vary substantially, which makes it challenging for different stakeholders to grasp the concept clearly. In addition, the various definitions of community networks[35] can be challenging to translate into concrete action, and may lead to a perception of the concept as vague and poorly formulated.

Some of these existing definitions were written before the evolution of the models for community connectivity seen in recent years, and are therefore inconsistent with practices on the ground. For instance, in 2016 these definitions[36] described a model of a telecommunications network where an individual would purchase and install a device and make its location and configuration public so "neighbours" could purchase their own device and extend the network organically, sharing the costs of a single, or multiple, upstream connection(s).

Many of these community networks, especially in Europe, grew to a considerable number of users – several thousands – using this approach. In South Africa, many "wireless user groups" appeared in different cities using this model. In most of these cases, networks extended without central planning and were maintained on a

35 The following definitions – one strong, the other weaker – were developed in the context of the Local Networks (LocNet) initiative: "Communication networks that are built, owned, operated and used by citizens in a participatory and open manner." (*Global Information Society Watch 2018: Community Networks,* https://giswatch.org/2018-community-networks) and "Although there is no commonly accepted definition, these networks are usually called 'community networks' because local communities are involved in some way in deploying, owning and operating the physical infrastructure that supports voice or internet connectivity." (*Bottom-up Connectivity Strategies*, N. Bidwell and M. Jensen: https://www.apc.org/en/pubs/bottom-connectivity-strategies-community-led-small-scale-telecommunication-infrastructure).

36 https://www.rfc-editor.org/rfc/pdfrfc/rfc7962.txt.pdf and https://www.intgovforum.org/system/files/filedepot/45/declaration_on_community_connectivity_final.pdf.

voluntary basis. It was in this context that guifi.net[37] developed the commons approach to govern the infrastructure. In this approach, different participants would take on the role of managing the network, sometimes by installing the necessary intermediary infrastructure that allowed for a healthy expansion of the network. In order to govern these commons, tools were created so their contributions were considered fairly and balanced against their use of the network. Many of the community networks that grew in the same period did not implement that commons approach and most are no longer operational. These early models were critical in creating the foundations for new models to emerge, but the definitions that refer to them do not capture the diversity expressed in existing practice.

Different stakeholders have not accompanied this evolution on the ground, and their understanding of community networks and how they are implemented is based on the models described in the previous paragraph, which some consider unsustainable and lacking professionalism. This has led to confusion and challenges when engaging with stakeholders in the search for partnerships and support for initiatives currently being implemented or planned.

It has become evident that any single definition of community networks would fail to do justice to the richness and diversity of the different types of community participation, organisational and service delivery models being implemented. To address this diversity of initiatives yet still provide a concrete framework for analysis, two interrelated processes have been conducted. We have developed:

1. A set of 13 principles that capture the ethos of community-centred connectivity
2. A typology of community-centred connectivity initiatives developed through a combination of research and direct experience of the Local Networks (LocNet) initiative[38] to delineate identifiable models that have emerged.

37 https://guifi.net/en/node/38392.

38 Rhizomatica and APC's LocNet initiative has supported many of these endevaours since 2017. See: https://www.apc.org/en/project/connecting-unconnected-supporting-community-networks-and-other-community-based-connectivity.

The principles and their preamble are presented in a separate publication,[39] while this document presents the typology of emerging models. The methodology followed to develop this typology is included in Appendix 1.

In both processes, we have chosen to use the term "community-centred connectivity" rather than "community network". We recognise the potential risks in proposing a new term where a growing movement exists and some regulations and policies have been enacted using the term "community network". However, we believe the benefits outweigh those risks, because this new conceptualisation is both more inclusive and more practical in its approach. Besides, it is rooted in hard-won real experiences on the ground. In this sense, the new term is not a departure from this history, and characteristics of the initial models of community connectivity have been included in the typology; they still apply and are used within different initiatives around the world. At the same time, this new conceptualisation also embraces the "complementary access networks and solutions" language that has been incorporated in different resolutions of the International Telecommunication Union,[40] complementing it by nuancing and delineating those networks and solutions. All models presented in the typology complement other efforts made by the telecommunications industry to provide meaningful connectivity, and in no way aim at replacing them.

This typology and the principles should be considered documents in dialogue for thinking through setting up a community-centred connectivity initiative. Where possible, we have tried to align the language in the two documents, which were developed through different approaches, but in some instances the language here is necessarily more technical for the purposes of clarity. This typology is about mapping the complexities of different models so that communities are aware of the potential options available, while the principles offer a considered qualitative account of issues to consider when deciding which model to implement.

39 https://www.apc.org/en/node/40458.

40 Resolution 37 (Rev. Kigali, 2022): Bridging the digital divide. https://www.itu.int/md/meetingdoc.asp?lang=en&parent=D18-WTDC21-C-0103 and Resolution 139 on Use of Telecommunications/ICTs to bridge the digital divide and build an inclusive information society. https://www.itu.int/pub/S-CONF-ACTF-2022.

The principles are critical to a reading of this typology in that they articulate the social values or ethical underpinning of a community-centred connectivity initiative. There are also clear intersections between the principles and the typology. For instance, the principles on human rights, gender, local culture, environmental awareness, safety and capacity building need to be considered when deciding on the kinds of services offered to a community; the principle on ownership when deciding what operator or ownership model to use, or when planning the management of the initiative; or the principle on sustainability with respect to the characteristics dealing with costs and pricing.

The underlying perspective of the principles is that the more principles an initiative adheres to, the more likely it is to address digital exclusion and transform the relationship between the community and its own development.

This typology is also a reflection of the growing recognition that there are many types of initiatives that, without being developed by the community itself, can be "community-centred". These initiatives are often established in communities by what can be considered long-term "partners", and besides providing very necessary connectivity services, they have other positive social impacts such as training and hiring people from the community, procuring services from the community, and reducing access costs considerably. They have a "social mission" or, as included in the principles, are concerned with the "well-being" of the community. Besides this, it is acknowledged that there will be communities not interested or able (with a rational use of resources) to provide connectivity to themselves sustainably. This includes private businesses that were created (or evolved) to have a strong social mission and are generating benefits to the communities and who felt excluded from the community networks movement.

It is important to acknowledge that this is a first attempt at creating this typology, and it is likely to evolve and be improved in the future.

We hope that this typology will offer a sharper lens through which to see community-centred connectivity initiatives, contributing to clearer communication with potential partners and stakeholders,

including donors and regulators, and presenting communities with a practical set of options. Ultimately, we hope it supports the growing movement of community-centred initiatives across the world, by incorporating many valuable lessons from those who felt previously excluded from the "community networks" definitions and models but are also contributing to closing the persistent digital and development divides that most communities are still facing.

1.2 Frame of reference for the typology

Initiatives at the community level are the unit of analysis for the community-centred connectivity typology.

In this context, community is defined as "people with common ties residing in a common geographic area",[41] whether in urban, rural or remote areas. The common geographic area may be governed by tribal or Indigenous authorities, or a democratically elected administration. In this sense, community members have institutions in common, and have strong social ties, and shared identities and actions tied to a particular place.

This definition of community differs from others used in the "community networks" literature, especially around those working on common pool resource models, where the community is composed of those who participate in the "network", with their different roles and interests.[42] In the case of guifi.net, with their network spanning hundreds of kilometres, their "community" is composed of numerous "geographical communities".

"Community-centred connectivity" refers to the use of the internet connectivity being focused on the needs of the community; or, as stated in the first principle, initiatives that provide "meaningful internet communications infrastructure or services to communities [...] that respond to the diverse needs and interests of communities so that they can be empowered to participate in their own development." However, of the 13 principles, the first four can be considered

41 Adapted from: MacQueen, K. M., et. al. (2001). What is community? An evidence-based definition for participatory public health. *American Journal of Public Health, 91*(12), 1929-1938. https://doi.org/10.2105/ajph.91.12.1929.

42 Baig, R., et al. (2015). guifi.net, a crowdsourced network infrastructure held in common. *Computer Networks, 90*, 150-165. https://doi.org/10.1016/j.comnet.2015.07.009.

foundational to any initiative that wants to consider itself "community-centred".[43] With respect to the remaining principles, an initiative may focus on none, any, or a mix of principles, depending on its objectives. The distinction in the typology between "transactional", "social inclusion" and "transformational" services that an initiative may provide applies here,[44] as the other nine principles can be realised through the provision of social inclusion and transformational services. At the very least, by adhering to the first four principles, the services will go beyond being merely "transactional". In this way a community-centred initiative can be distinguished from an ordinary service provider.

As suggested in the preamble, by using the word "initiatives" instead of "networks", or even terms such as "connectivity providers", we are able to consider different models of participation that have been identified in real cases. For example:

- Multi-organisational initiatives, where different organisations implement the initiative in partnership with each other.
- Organisations participating in multiple community-centred connectivity initiatives. This is the case for different support organisations.
- Organisations working on initiatives that are both community-centred and not community-centred. This can be the case of companies within the telecommunications sector engaging as partners in multi-organisational community-centred connectivity initiatives with local organisations. These companies usually fit under the small to medium-sized enterprise parameters, but there are instances of multinational companies too.

When a community-centred connectivity initiative is run by a single organisation engaged in the provision of internet services, it should be

43 1) Addresses community needs: Provides meaningful internet communications infrastructure or services to communities in urban, rural and remote locations that respond to the diverse needs and interests of communities so that they can be empowered to participate in their own development; 2) Participatory: Enables the community to shape the infrastructure or services by participating in developing its community-centred vision and its deployment, operations and use; 3) Support: Works with different stakeholders to achieve its vision in ways that encourage the community's autonomy; 4) Well-being: Improves the personal, social, political and economic lives of people living in the community, particularly for those who are structurally marginalised, such as women, the youth and elderly, refugees, racial and ethnic minorities, and disabled people.

44 More about the distinction between these two services can be found in section 3.10 below.

understood in similar terms as an internet service provider (ISP). As such, all models in the typology adhere to the definition in Wikipedia:

> An Internet service provider (ISP) is an organisation that provides myriad services related to accessing, using, managing, or participating in the Internet. ISPs can be organised in various forms, such as commercial, community-owned, non-profit, or otherwise privately owned.[45]

The term "internet service provider" is a very well-understood and used term in the telecommunications sector. However, many stakeholders, drawing on the historical definitions of what an ISP is, still today refer to them as something totally different from community networks. In this typology, it is argued that community-centred connectivity initiatives run by a single organisation are a type of ISP that not only provides internet services but goes beyond that, insofar as they intentionally seek to have a positive social impact in a community. It could be argued that multi-organisational arrangements could be referred to in the same way, but in these cases it is more complex given that the liabilities and compliance related to telecommunication licences can only be held by one organisation.

Some of the literature consulted differentiates between the types or models depending on the technology they use to provide internet communications infrastructure or services to communities, yet there seems to be consensus that in most cases, initiatives use a toolbox of technologies. Technology choices are also based on regulatory restrictions, and those restrictions may (and should) change over time – for example, access to spectrum to deploy community cellular (mobile) networks. Because of this, the attempt was to develop a technology-neutral typology.

Finally, it is important to note that initiatives themselves evolve over time. For example, some might move from a model of community self-provision – or closer to principle 12, where the initiative "strives for community ownership of the infrastructure or services through open and inclusive participation in its governance and management" – to one that is more

45 https://en.wikipedia.org/wiki/Internet_service_provider.

entrepreneurial in its outlook and involves fewer community members. Similarly, within the social entrepreneurial models, there might be an evolution, at times imposed by regulations that limit for-profit services, from entrepreneurial non-profit models to social businesses. While there is a need to define and distinguish different kinds of initiatives, in practice initiatives may, at times, also use a combination of different models to achieve their community vision.

1.3 Explanation based on characteristics

The diagram at the end of Section 1, which illustrates the different types of community-centred connectivity initiatives identified ("Self-provision", "Public municipal", "Entrepreneurial non-profit", "Social cooperative" and "Social business" models), encompasses 11 defining characteristics that are described below. Two well-known non community-centred types ("Private business" and "Public national/regional") are added for comparison.

1.3.1 Geographical focus

Main goal of this characteristic: To differentiate community-centred initiatives from those that are not community-centred.

Options for this characteristic:

- Community-centred;
- Not community-centred.

Community-centred: The analysis here is based on the framing of the typology above, i.e. if the focus of the initiative is the community, and whether there is adherence to the four foundational principles.

Not community-centred: This includes initiatives whose geographical focus is at the national or regional level (for instance, government initiatives aimed at meeting the objectives of a national broadband plan).

1.3.2 Purpose

Main goal of this characteristic: To differentiate between social and traditional enterprises, as well as between entrepreneurial ventures and others.

Options for this characteristic:

- Community development;
- Public service;
- Social enterprise.

Community development: This is understood as "a process where community members come together to take collective action and generate solutions to common problems."[46]

Public service: This is understood as "any service intended to address specific needs pertaining to the aggregate members of a community."[47] Public services are available to people within a government jurisdiction as provided directly through public sector agencies or via public financing to private businesses or voluntary organisations.

Social enterprise: Social enterprises are identified by the Organisation for Economic Co-operation and Development (OECD) as "any private activity conducted in the public interest, organised with an entrepreneurial strategy, whose main purpose is not the maximisation of profit but the attainment of certain economic and social goals, and which has the capacity for bringing innovative solutions to the problems of social exclusion and unemployment."[48]

More recently, the European Commission has defined a social enterprise as being "an operator in the social economy whose main objective is to have a social impact rather than make a profit for their owners or shareholders. It operates by providing goods and services for the market in an entrepreneurial and innovative fashion and uses its profits primarily to achieve social objectives. It is managed in an open and responsible manner and, in particular, involves employees, consumers and stakeholders affected by its commercial activities."[49] This differs clearly from the foundational goal of most private businesses, which is to trade goods and services in a market primarily for private benefit (or profit).

46 https://en.wikipedia.org/wiki/Community_development.

47 https://en.wikipedia.org/wiki/Public_service.

48 https://web-archive.oecd.org/temp/2023-12-11/566784-social-entrepreneurship.htm.

49 Ibid.

1.3.3 Institutional model

Main goal of this characteristic: To differentiate between the options for the location of the organisation and level of formalisation of the group driving the initiative, as well as referring to the possibility of being a multi-organisational arrangement.

Options for this characteristic:

- Initiated from (predominantly) inside the community by (usually) a registered organisation; tends to be a multi-organisational arrangement with external actors;
- Local government;
- Initiated from inside or outside the community by a registered organisation; tends to be a multi-organisational arrangement;
- Cooperative, usually from inside the community;
- Company, usually from outside the community.

1.3.4 Legal structure of the organisation(s) driving the initiative

Main goal of this characteristic: To differentiate between the options for the legal nature of the organisation driving the initiative given the practical implications in the provision of services to the community.

Options for this characteristic:

- Civil society organisation (NGO, CBO, civic association, etc.);
- Local government;
- Non-stock/non-profit company or corporation;
- Cooperative with community and/or societal objectives;
- Limited company or corporation.

Civil society organisations (CSOs) is a broad term, and here the work by the United Nations Development Programme (UNDP) is considered.[50] CSOs comprise the full range of formal and informal organisations within civil society, such as non-governmental organisations (NGOs), community-based organisations (CBOs),

50 UNDP. (2006). *UNDP and Civil Society Organizations: A Toolkit For Strengthening Partnerships*. https://sustainabledevelopment.un.org/content/documents/2141UNDP%20and%20Civil%20Society%20Organizations%20a%20Toolkit%20for%20Strengthening%20Partnerships.pdf.

Indigenous peoples' organisations (IPOs), academia, journalist associations, faith-based organisations, trade unions, and trade associations. Civil society constitutes a third sector, existing alongside and interacting with the state and market. The UNDP defines civil society organisations in its policy of engagement with CSOs (2001) as "non-state actors whose aims are neither to generate profits nor to seek governing power. CSOs unite people to advance shared goals and interests."

Local government is used as "institutional units whose fiscal, legislative, and executive authority extends over the smallest geographical areas distinguished for administrative and political purposes."[51]

The remaining three models, **non-stock/non-profit company or corporation**, **cooperative with community and/or societal objectives** and **limited company or corporation**, represent different ways that an initiative participates in the market, depending on its incorporation. These social enterprise options depend on the legal frameworks at the national level. For instance, in some countries, legal definitions for non-stock[52] or non-profit companies or corporations do not exist.

The choice of legal incorporation also has implications on the options available for the sustainability of the initiative. For instance, in some jurisdictions, CSOs are not allowed to engage in the sale of goods or services, making their sustainability reliant on donations and grants. Another example is that of non-stock companies, who are not able to engage in equity-related agreements with potential investors. In some countries, local governments may be allowed to establish their own connectivity initiatives.

In most countries, **cooperatives**, given that they have been around for a long time, have their own legislation, which tends to adhere to the principles that cooperatives follow internationally.[53]

51 https://en.wikipedia.org/wiki/Local_government.

52 https://en.wikipedia.org/wiki/Non-stock_corporation.

53 International Co-operative Alliance. (2015). *Guidance Notes to the Co-operative Principles*. https://ccr.ica.coop/sites/default/files/2021-11/ICA%20Guidance%20Notes%20EN.pdf.

1.3.5 Role of community organisations in the telecommunications value chain – Operator/ ownership model

Main goal of this characteristic: The role of community organisations in the telecommunications value chain[54] relates to the provision of connectivity and takes different forms depending on the segments they operate and/or own.

Options for this characteristic:

- Integrated operator;
- Open access operator;
- Service provider;
- Reseller;
- Installation and maintenance;
- Advisor;
- End user.

The first four options are based on whether the community organisation operates the:

- Passive infrastructure: The physical non-electronic medium over which information can be transmitted. It typically has a lifespan of >50 years. Examples are ducts, masts, poles, network operations centre (NOC)[55] and fibre.
- Active infrastructure: Electronic equipment needed to encode information sent over the network into physical signals. It typically has a lifespan of 5-15 years. Examples are case stations, wireless access points, switches, routers and servers.
- Services: Sales, customer care, billing, internet, hosting and other services for end users.

The assumption is that in order to operate any of the infrastructure elements above, you need to own the hardware required.

Depending on which elements are owned, the following models Table 1.1 are observed in the literature.

54 https://digital-strategy.ec.europa.eu/en/policies/broadband-actors-value-chain.

55 https://en.wikipedia.org/wiki/Network_operations_center.

Table 1.1

	Passive infrastructure	Active infrastructure	Services
Integrated operator	x	x	x
Open access operator	x	x	
Service provider		x	x
Reseller			x

Given the diversity in the multi-organisational arrangements for self-provision and entrepreneurial non-profits, there are examples of initiatives within these types that follow all of the models above, except open access. The open access model does not consider providing connectivity-related services to the end user (i.e. retail), but is concerned with making infrastructure available to different connectivity initiatives. While there are examples of open access models run by big municipalities, predominantly in the global North, this does not seem to be a model case in most marginalised communities.

Further, other roles identified based on experience are:

- Installation and maintenance;
- Advisor;
- End user.

Installation and maintenance and **Advisor** are added as these are particular roles that community organisations play, especially as part of the social business model, when they do not operate (or own) any of the elements above, but still play a significant role in the initiative. When any of the operator models above apply to the initiative, **Installation and maintenance** and **Advisor** are not included as they are considered redundant.

End user is included for the sake of the comparison with non-community-centred models. If that is the only role the community plays, there is no community participation.

Note that at times, community participation in any of the roles above may come from individuals from within the community who are hired for installation and maintenance, get an income from reselling or play advisory roles. They may do that informally, or as independent contractors,

so the term "organisation" is not used canonically. Sometimes those individuals perform the roles or follow the models above, registering a sole proprietor enterprise/business. Note also that the fact that these private businesses are owned by people from the community does not mean they are community-centred connectivity initiatives.

1.3.6 Planning and management of the initiative

Main goal of this characteristic: To differentiate between the centralisation levels in planning and managing the initiative observed across types.

Options for this characteristic:

- Decentralised;
- Centralised;
- Public-private partnership.

The history of community networks is one of **decentralised** planning and management, with the Pico Peering Agreement,[56] which turned 30 years old recently, showing this clearly. Tools, such as for configurations or radio planning, were made available to help people use their own hardware and extend networks, as long as the principles of the agreement were met. Very few instances of that decentralised planning remain in the global South, where most of the planning and management is **centralised** in the organisations driving the initiative or in some of the more skilled partners in a multi-organisational arrangement.

In the case of government-led initiatives, most follow a **public-private partnership** model. There are many of these models that are used in practice,[57] but these three are the most common:

- Public design build operate (DBO): A public entity owns, constructs, deploys and operates the initiative without any input from private sector actors.
- Management contacts/lease and affermage:[58] A public entity owns or builds a network and engages private actors to manage specific functions or maintenance and operations of network infrastructure.

56 https://picopeer.net/.

57 BCG & Giga. (2021). *Meaningful school connectivity: An assessment of sustainable business models*. https://s41713.pcdn.co/wp-content/uploads/2021/11/BCG-Giga-Meaningful-school-connectivity-1.pdf.

58 https://ppp.worldbank.org/public-private-partnership/agreements/leases-and-affermage-contracts.

- Concessions and build operate transfer (BOT): A public entity awards long-term rights to use assets to a private operator, in exchange for the latter financing, designing, constructing, owning and operating a facility stated in the concession contract.

Similarly, in some multi-organisational arrangements, the organisation driving the initiative may have an agreement with a third party, usually a service provider, who installs and monitors the performance of the telecommunications infrastructure using a centralised management platform.

1.3.7 Initial investment/expansion of infrastructure (CAPEX)

Main goal of this characteristic: To differentiate between the options for initial investment for capital expenditure (CAPEX) available to the different types.

Definition of CAPEX: The money an organisation or corporate entity spends to buy, construct, maintain or improve its fixed assets, such as buildings, towers, vehicles, equipment or land.

Options available for this characteristic:

- Investment from users
- External and local non-returnable support: subsidy, grant or donation
- Public budget
- Cost of hardware recovered in the price of sales
- Private finance.

These are all sources to pay for the initial investment/expansion of infrastructure and are considered as follows:

Investment from users/members: As described in section 3.6, there are decentralised models in which users contribute their own hardware to extend the network. In other cases, users pool resources from the community to afford all or part of the CAPEX required to build the infrastructure. Initial investment from members is also common in cooperatives.

External and local non-returnable support: subsidy, grant or donation: This may appear self-explanatory, as there are a myriad of sources of non-returnable grants, subsidies and donations. In the case of donations, sometimes land for towers and buildings, as well as buildings, can be donated by the community or an institution located there (school, hospital, etc.). Equipment donated by vendors, or equipment that becomes available when other providers upgrade their networks or decommission it for whatever reason, gets donated too.

Public budget: Local municipalities use their own budget, or other financial mechanisms available to local governments, to cover the capital expenses.

Private finance: This comes from private funds. Seed funding often comes from those driving the initiative and their friends, family and angel investors. As they grow, subsequent rounds of CAPEX may come from more impact investors and other commercial loans.

Cost of hardware recovered in the price of sales: When sufficient funds are available from any of the sources above for the initial round of CAPEX, the cost of subsequent rounds (or the replacement of the equipment over time) may come from recovering the initial costs as part of the price paid by the users.

Different types in the typology use all or some of the options above. And even when particular options are included for a particular type, they might be present with different intensity and focus. For instance, while social businesses will cover their CAPEX primarily from private finance, that case is rare to date in entrepreneurial non-profits. It is also important to highlight that different operator and ownership models (characteristic 3.5) are more CAPEX intensive than others, with the reseller being the least intensive and the integrated operator the most intensive.[59]

59 Forster, J., Matranga, B., & Nagendra, A. (2022). *Financing mechanisms for locally owned internet infrastructure*. APC, Connect Humanity, Connectivity Capital and the Internet Society. https://www.apc.org/sites/default/files/financing-mechanisms-for-locally-owned-internet-infrastructure.pdf.

1.3.8 Sustainability model (OPEX)

Main goal of this characteristic: To differentiate between the options for covering the operational costs (OPEX) of the initiative for the different types.

Definition of OPEX: This refers to the ongoing expenses that are inherent to the operation of the assets and services.

Options available for this characteristic:

- External and local non-returnable support: subsidy, grant or donation;
- Public budget;
- Market sales;
- Membership fees;
- Action-based subsidies;
- Barter transactions.

"**External and local non-returnable support: subsidy, grant or donation**" and "**public budget**" are defined in a similar way as previously, but here they are used to cover operational costs. In the case of donations, these can range from in-kind contributions from community members (from usage of land or space on their roofs for high sites to voluntary work) or from external partners in the form of bandwidth, rack space in data centres, etc.

Example of **market sales:**

- Usage based (prepaid): The standard pricing system for consumer connectivity services in low- and middle-income countries. Here the consumer pays for data services through a prepaid pay-as-you-go model. This can take the form of very low-cost incremental pricing, offering users time-based packages for internet connectivity.
- Usage based (postpaid/subscription): A subscription refers to a service where a customer is billed for the service on a monthly basis at the end of each monthly billing cycle, after consuming services they are entitled to use.
- Value-added services: Operating expenses are covered by services other than data usage, such as value-added services that

subsidise data provision (e.g. printing, internet cafes, training, device charging and repair, and access to information systems). In some cases the income comes from selling services to other operators (e.g. capacity in the backbone/backhaul or space on their towers).

Membership fees: In cooperatives and other civil society organisations, member fees are used to cover the cost of operating and maintaining the infrastructure. In informal arrangements in small communities, these fees are set so they recover the monthly costs of operation (primarily the cost of bandwidth).

Action-based subsidies: Customers undertake certain actions to receive blocks of connectivity time or capacity. This may entail watching commercial adverts, which brings advertising income to the provider, i.e. the advertisement company subsidises the service. In other cases it can be the government, national or municipal, who subsidises this for those who cannot afford it.[60]

Barter transactions: This is a non-monetary transaction to pay for connectivity, but can be helpful to drive adoption outcomes. This can be for goods (i.e. agricultural products) or services (rights of way/access to land/high sites) in exchange for connectivity services.

Different types in the typology use all or some of the options above. And even when particular options are included for a particular type, they might be present with different intensity and focus. For instance, while social businesses will cover their OPEX primarily from market sales, others use a combination of sources, with market sales playing a less prominent role. It is also important to highlight that different operator and ownership models (characteristic 3.5) are more OPEX intensive than others, with the reseller being the least intensive and the integrated operator the most intensive.[61]

1.3.9 Pricing model

Main goal of this characteristic: To differentiate between the pricing that each type offers for their connectivity-related services.

60 https://www.internetforall.gov/program/affordable-connectivity-program.

61 Forster, J., Matranga, B., & Nagendra, A. (2022). Op. cit.

Options available for this characteristic:

- Market price;
- Below market price;
- Cost recovery;
- Free of charge.

Market price is the economic price for which a good or a service is offered in the market. As a community is considered a new market segment, or even different groups within the community can be considered a new market segment, here, and in general in the telecommunications sector, market prices are those offered by the incumbent operators with a national footprint.

Mechanisms to sustain subsidised prices **below market rates** as well as **free** services exist thanks to options to cover the CAPEX and OPEX that are not based on sales alone. Also, because the telecommunications sector has historically been built by private investment seeking high returns, which then set (and still do) a significant component of the **market prices** for telecommunication services, prices can be quite high in some countries. In other contexts, particularly in those where self-provision models are used, the pricing model is **cost recovery**: dividing the cost of service or OPEX (usually the bandwidth) between the users. Given that community-centred connectivity initiatives are leaner and have lower OPEX than traditional operators,[62] and they can access alternative sources for CAPEX, below market prices can be offered too. If more private finance at concessional rates could be made available to these models, more communities could benefit from more affordable connectivity services.

Different types in the typology offer all or some of the options above. And even when particular options are included for a particular type, they might be present with different intensity and focus. Some initiatives use a combination, selling services at market price to

62 Rey-Moreno, C., Greene, L., & Jensen, M. (2024). Innovative financing mechanisms to bridge the digital divide. In A. Finlay (Ed.), *Global Information Society Watch 2024 Special Edition: WSIS+20: Reimagining horizons of dignity, equity and justice for our digital future*. https://www.giswatch.org/en/internet-governance-civil-society-participation-internet-rights/innovative-financing-mechanisms.

commercial clients, which in turn allows them to offer below market prices or even free services to less economically resourced users.

1.3.10 Nature of services provided in the community

Main goal of this characteristic: To introduce transformational services as a key way of differentiating community-centred connectivity-related services from other internet services providers, or corporate social responsibility initiatives. It is also important to introduce social inclusion services as a way to differentiate community-centred operators from operators who are not community-centred.

Options available for this characteristic:

- Transactional services;
- Social inclusion services;
- Transformational services.

Different types in the typology provide all or some of the services above. And even when particular services are included for a particular type, they might be present with different intensity and focus. For instance, while most self-development and entrepreneurial non-profit models will have a particular focus on transformational services, very few, or none, of the social businesses and the municipal networks will provide them.

Transactional services: These relate to connectivity services that can be accessed via a payment of money or other form of agreed transaction in exchange for the service.

Social inclusion services: These are oriented towards addressing digital exclusion. They relate to services addressing meaningful connectivity,[63] or other factors behind the "usage gap".[64] Examples include:

- Affordable internet;
- Services in local languages or to meet other community needs (content);

63 Diga, K., Brock, N., & Zanolli, B. (2024). What does "meaningful connectivity" actually mean? A community-oriented perspective. In A. Finlay (Ed.), *Global Information Society Watch 2024 Special Edition: WSIS+20: Reimagining horizons of dignity, equity and justice for our digital future.* https://www.giswatch.org/en/internet-governance-civil-society-participation-internet-rights/what-does-meaningful.

64 GSMA. (2022, 21 September). Addressing the Mobile 'Usage Gap' is Key to Achieving Sustainable Development Goals. https://www.gsma.com/newsroom/press-release/addressing-the-mobile-usage-gap-is-key-to-achieving-sustainable-development-goals/.

- Access to shared devices (i.e. computer labs or hubs);
- Environmental sensors and other "internet of things" networks that bring meaning to the connectivity and address communities' needs;
- Training for digital skills.

Transformational services: These are oriented at enabling local people to become actors in their own development. These are services that build their capability to own, govern and manage digital resources in a way that could positively impact on their lives and the lives of their families and communities. Transformational services enable the poor and excluded to be co-owners, supervisors, managers and decision makers or to become leaders and stakeholders of the social enterprises that provide digital-related services and ensure meaningful connectivity.

Note: "Transactional services" and "social inclusion services" are those that apply to the "users/customers" of the digital-related services. "Transformational services" are usually directed towards those who provide, manage and operate those services. "Social inclusion services" and "Transformational Services" have to do with the realisation of what might be called the aspirational principles (Principles 5-13).

1.3.11 Model for provision of transformational services

Main goal of this characteristic: To differentiate between the options for provision of transformational services.

Options available for this characteristic:

- Internal and external actor(s) provide(s) the transformational services;
- Offered through parallel local government initiatives;
- External actor(s) usually provide(s) the transformational services;
- Core to the principles of incorporating a cooperative;[65]
- Led by an initiative with input/participation from community members/stakeholders with support from a third party with development experience.

65 International Co-operative Alliance. (2015). Op. cit.

1.4 Operationalising the typology

We understand that this typology requires additional tools to make it practically useful for different stakeholders and so that a selected model can be operationalised. We have envisaged identifying and creating these tools as a next step.

For instance, for communities planning an initiative or for those organisations supporting them, it would be important to develop decision trees with the implications of the different options they can choose clearly mapped to the local context. This is particularly important when deciding on institutional models and when incorporating organisations, especially those at the community level, that may play a role in the initiative. In most cases, these decisions will have to take into consideration the national legal framework and the options available locally.

Similarly, tools for regulators will have to be created in order for these types to find a place in existing or future licensing frameworks. In many regulatory frameworks, differentiated licences exist for infrastructure and services, and it might be that in multi-organisational arrangements, organisations in the partnership hold different licences. There are countries where one single licence may exist for both and other considerations will be needed – for instance, in Kenya, a community network service licence, where the geographical area where the licensee can provide services is bigger than the "community" defined in this typology. That doesn't mean the framework needs to be modified, as the multi-organisational arrangements described in the typology would work here, with an organisation holding the licence required and working in partnership with different communities and organisations at that level. Similarly, in that and other frameworks, there seems to be an embedded assumption that non-profit models are only of the CSO type, and this has an impact on the sustainability of the initiatives when they are not allowed to sell services. We believe the tools to be created for regulators will contribute to clarifying this. In many jurisdictions, there are already asymmetries with incentives for "small" commercial ISPs (traditionally private businesses). We believe that these tools will contribute to creating additional incentives for those social businesses, which are not a common case in the telecommunications industry, but by being (or becoming) community-centred have a higher development impact.

Finally, financiers and external donors will appreciate understanding the different roles played by partners in multi-organisational settings

while having clarity about who is responsible for the management of the funds and accounting.

1.5 Appendix 1. Methodology followed in the development of the typology

The draft typology was developed through extensive background research on papers (please see list below) and other resources where attempts to define community initiatives have been made, as well as through consultations with individuals and small groups where the evolving typology was presented:

- Meetings were held with stakeholders to get their input into the typology.[66]
- An online meeting was held with stakeholders who were invited using the same email lists as above to get their input into the typology. Two meetings were held to accommodate the different time zones. The meetings were held on Wednesday 10 July 2024 at 8-9 UTC (Asia, Africa and Europe), and 15-16 UTC (LAC, North America).

In order to identify emerging models, this typology builds on research produced over the past decade that contains elements of modelling community networks or other complementary and alternative models to provide last-mile connectivity. This includes:

- Internet Research Task Force (IRTF). (2016). Request for Comments 7962 – Alternative Network Deployments: Taxonomy, Characterization, Technologies, and Architectures. https://www.rfc-editor.org/rfc/pdfrfc/rfc7962.txt.pdf.
- IGF Dynamic Coalition on Community Connectivity. (2017). "Declaration on Community Connectivity", in *Community Networks: the Internet by the People, for the People*. https://www.intgovforum.org/system/files/filedepot/45/declaration_on_community_connectivity_final.pdf.
- Nicola Bidwell and Michael Jensen. (2019). *Bottom-up Connectivity Strategies: Community-led small-scale telecommunication infrastructure networks in the global South*. APC. https://www.apc.org/en/pubs/bottom-connectivity-strategies-community-led-small-scale-telecommunication-infrastructure.

66 This included Marie Lisa Dacanay from the Institute for Social Entrepreneurship in Asia (ISEA), Erick Huerta from Rhizomatica/REDES A.C., the LocNet team, and representatives of ISOC, Connect Humanity and the Beacon Project, as well as preliminary testing with 23 interviewees from the Asia-Pacific region involved in community-centred connectivity initiatives.

- Jim Forster, Ben Matranga and Anoop Nagendra. (2022). *Financing mechanisms for locally owned internet infrastructure*. APC, Connect Humanity, Connectivity Capital and the Internet Society. https://www.apc.org/en/pubs/financing-mechanisms-locally-owned-internet-infrastructure.
- ITU. (2020). *The Last mile Internet Connectivity Solutions Guide: Sustainable Connectivity Options for Unconnected Sites.* https://www.itu.int/en/ITU-D/Technology/Documents/LMC/ITU%20Last-Mile%20Internet%20Connectivity%20Solutions%20Guide%20-%20Slides%20_WtPhotos.pdf.
- BCG and Giga. (2021). *Meaningful school connectivity: An assessment of sustainable business models*. https://s41713.pcdn.co/wp-content/uploads/2021/11/BCG-Giga-Meaningful-school-connectivity-1.pdf.
- Jonathan Brewer, Yoonee Jeong and Arndt Husar. (2022). *Last Mile Connectivity: Addressing the Affordability Frontier*. Asian Development Bank. https://www.adb.org/sites/default/files/publication/847626/sdwp-083-last-mile-connectivity-affordability-frontier.pdf.
- Carlos Baca, Luca Belli, Erick Huerta and Karla Velasco. (2018). *Community Networks in Latin America: Challenges, Regulations and Solutions*. ISOC. https://www.internetsociety.org/resources/doc/2018/community-networks-in-latin-america/.
- Carlos Rey-Moreno. (2017). *Supporting the Creation and Scalability of Affordable Access Solutions: Understanding Community Networks in Africa*. ISOC. https://www.internetsociety.org/resources/doc/2017/supporting-the-creation-and-scalability-of-affordable-access-solutions-understanding-community-networks-in-africa/.

Additionally, the observations, findings and recommendations of internal and unpublished documents such as the report from an external evaluation that the LocNet initiative was subject to in 2022 were drawn on.

Significant effort was also made to incorporate the language of and align the typology with the analyses in social enterprise literature, in particular the work of the International Comparative Social Enterprise Models (ICSEM) Project from the International Research Network: https://emes.net/research-projects/social-enterprise/icsem-project-home/.

2 Towards Measuring the Social Impact and Cost Effectiveness of Community Centered Connectivity Initiatives: Insights from Case Studies in Asia and Africa

Marie Lisa Dacanay, Albert Teo and Jay Lacsamana

2.1 Introduction

Community centered connectivity initiatives (CCCIs) are social enterprises (SEs) within the digital economy. They are not merely internet service providers—they are mission-driven enterprises that prioritize purpose over profit, delivering meaningful connectivity to underserved populations. By combining sustainable business models with a focus on social impact, CCCIs empower marginalized communities to access, govern, and utilize digital resources, promoting economic inclusion and social transformation.

These initiatives reflect global trends in social entrepreneurship. The Global State of Social Enterprise Report (WEF, 2024), highlights that social enterprises collectively generate $2 trillion in annual revenue, create 200 million jobs worldwide, and actively contribute to all Sustainable Development Goals (SDGs). Despite their transformative potential, social enterprises, including CCCIs, continue to face challenges related to recognition, financing, and scalability, underscoring the need for stronger policy support and targeted investment.

Recognizing the importance of measuring their impact, the Institute for Social Entrepreneurship in Asia (ISEA), in partnership with the Association of Progressive Communications (APC) and Internet Society (ISOC), conducted a case study research on CCCIs across Asia and Africa. The study aimed to articulate the social impact of CCCIs and demonstrate their cost-effectiveness as innovative solutions for bridging the digital divide. Its findings contribute to the CCCIs' community of practice by introducing adapted social enterprise frameworks and impact measurement tools suited to their unique context.

2.1.1 CCCIs as Social Enterprises

As social enterprises, CCCIs deliver three core types of services: transactional, social inclusion and transformational services. Unlike traditional service providers, CCCIs go beyond providing access, creating sustainable digital ecosystems that enable communities to become active stakeholders in their own development.

- **Transactional services** focus on delivering affordable internet connectivity through financial or community-based exchange mechanisms. These services provide individuals and institutions with reliable access to the digital world, supporting education, commerce, communication, and essential services.
- **Social inclusion services** address the deeper issues of digital exclusion and the gap in meaningful connectivity. Designed to reduce affordability barriers and promote digital literacy, these interventions enable poor and marginalized groups to access education, healthcare, government services, and economic opportunities. They are tailored to reach both potential users and customers previously left behind by mainstream providers.
- **Transformational services** go further by equipping communities with the skills and capacities to govern and manage their own digital infrastructure. These services promote local ownership, inclusive governance, and long-term sustainability. Unlike the other two, transformational services target those who lead, manage, and operate connectivity systems, ensuring that the control of digital resources remains within the community and contributes to lasting empowerment.

2.2 Objectives and Methodology of the Study

This study contributes to the community of practice among CCCIs by enhancing their capacity to measure and communicate their social impact. To achieve this, the case research applies frameworks and tools used by social enterprises to help quantify the impact of CCCIs in the areas of economic inclusion, digital equity, and community empowerment.

2.2.1 Objectives

The overall objective of the study was to conduct a social impact analysis of CCCIs, using the Development Indexing (DI) and Social Return on Investment (SROI) methodologies. These tools offer structured approaches to assess impact and particularly for SROI, monetize the social and economic values generated by CCCIs.

Specifically, the study aimed to:

- Articulate the social impact of CCCIs by identifying key result areas, performance indicators, and transformational outcomes.
- Demonstrate that investing in CCCIs is an effective and efficient strategy for bridging the digital divide and connecting unconnected communities, ensuring long-term sustainability and digital inclusion.

The study's findings are expected to support CCCIs in advocating for policy recognition, financial investment, and expanded digital access, reinforcing their role as social enterprises that drive meaningful connectivity and community development.

2.2.2 Methodology

The study employed a case research approach, conducting both within-case and cross-case analyses of four relatively successful CCCIs across Asia and Africa. It identified patterns, successes, and challenges that shaped the effectiveness and sustainability of CCCIs in bridging the digital divide from the experience of the four CCCIs studied. Table 2.1 outlines the organizational nature of each CCCI, its key partners, and its respective location and country.

Table 2.1. Nature of Organization, Key Partners and Location of CCCI Cases

CCCI	Nature of Organization & Key Partners	Location	Country
Kasepuhan Ciptagelar	Common Room (Foundation), Kasepuhan Ciptagelar (indigenous village), and Awinet (ISP company)	Indigenous village in West Java (rural)	Indonesia
Pathardi	Local association in partnership with Panchayat (a local self-government institution)	Pathardi, Maharshtra, West India (rural)	India

CCCI	Nature of Organization & Key Partners	Location	Country
TandaNET	Community-based organization	Kibera, Nairobi (urban slum)	Kenya
Zenzeleni	Not for profit company; cooperatives	Mankosi & Zithulele, Eastern Cape (rural)	South Africa

Data Gathering. A multi-method approach was used to collect both primary and secondary data, ensuring a comprehensive analysis of the selected CCCIs. A review of related literature and organizational documents helped to provide the contextual background on digital inclusion, social enterprise models, and the policy environments surrounding these CCCIs in Asia and Africa.

Primary data was collected through key informant interviews and focus group discussions with stakeholders involved in implementation and governance.

- **Kasepuhan Ciptagelar (Indonesia):** Interviews were conducted with Common Room Networks Foundation officers and staff, as well as seven key informants from partner organizations, including the Lebak Disaster Response Agency, Economic Recovery and Development Center, Ciptagelar Governance, Awinet ISP, Portkesmas CSO, ICT Watch, and representatives from the youth sector.
- **Pathardi (India):** Interviews with BAIF officers and staff were complemented by a focus group discussion involving five community residents: two e-DOSTs (tribal women entrepreneurs), two small farmers, and one Warli artist.
- **TandaNET (Kenya):** Data collection included key informant interviews and community-based assessments with individuals in network operations, local governance, and digital inclusion. The research team engaged with TandaNET's executive council and staff, as well as representatives from connected community centers, schools, and micro-enterprises. Focus group discussions were held with entrepreneurs, educators, and grassroots activists to gather perspectives on affordability, infrastructure, and cybersecurity risks.
- **Zenzeleni (South Africa):** Stakeholder interviews were conducted with cooperative members, technical staff, and digital literacy

trainers to assess local internet governance and economic impact. The team also engaged with Zenzeleni Networks NPC and representatives from the Mankosi and Zithulele villages, as well as healthcare institutions benefiting from connectivity. A community survey measured the impact of internet access on education, healthcare delivery, and business growth. Policy and financial documents were reviewed to analyze network sustainability, cost structures, and the licensing dynamics within South Africa's telecommunications regulatory framework.

2.3 Development Indexing (DI) and Social Return on Investment (SROI)

The study employed two key analytical tools: Development Indexing (DI), which assists in articulating multiple aspects of social impact, and Social Return on Investment (SROI), which evaluates cost-effectiveness by comparing investment to financial and monetized social benefits. Together, these methodologies offer a structured assessment of economic, educational, governance, and digital inclusion outcomes, providing a comprehensive understanding of CCCIs as social enterprises advancing meaningful connectivity.

DI is a structured methodology designed to quantify social impacts where simple proxy measures are inadequate. It functions as a tool for planning, monitoring, and evaluation, helping CCCIs align their interventions with their vision, mission, and stakeholder priorities. DI enables a comprehensive assessment of digital inclusion efforts, making it particularly valuable for evaluating the long-term social impact of CCCIs.

As this study was the first application of DI in the context of CCCIs, a new framework was developed to define Key Result Areas (KRAs), sub-elements, and potential performance indicators (PIs). To assess the significance of impact, the study assigned qualitative ratings of high, medium, or low (or significant and not-significant) based on two criteria: extent of reach and depth of impact. An impact was considered significant if (1) both criteria were rated high, (2) both were medium, or (3) at least one was high. While the final stage of DI typically involves a scorecard system (ranging from 1-100) to quantify indicators with relative weights, this study did not reach that

stage but was able to identify the most important key result areas and performance indicators where significant impact was notable.

SROI was the other key analytical tool used to evaluate the cost-effectiveness of the four CCCIs. SROI measures the financial and social value generated relative to the cost of inputs, expressed as a ratio. The SROI ratio compares the aggregate monetized value of all material financial and social outcomes experienced by stakeholders (numerator) to the total financial investment required to run the initiative (denominator). An SROI ratio greater than 1 indicates cost-effectiveness, meaning that for every dollar invested, more than one dollar was generated in terms of financial and social value.

Monetization of social benefits is one of the challenges faced in using SROI as a methodology. Tangible benefits, such as increased income, cost savings from internet use, or job creation, are relatively straightforward to quantify and monetize. However, intangible benefits like enhanced digital literacy, inclusive human development, and strengthened community governance present greater challenges. These require the use of well-designed proxy indicators to estimate value. Despite such complexities, SROI provides a robust and comparative framework, allowing CCCIs and their investors to assess the sustainability and efficiency of digital inclusion initiatives in bridging the digital divide and promoting economic empowerment.

DI and SROI are complementary methodologies in social impact measurement. Together, these tools create a holistic framework for evaluating the effectiveness and cost-efficiency of CCCIs in driving economic inclusion, expanding access to education and healthcare, and strengthening digital governance.

2.4 Context and State of Digital Connectivity in the Base Countries of the CCCIs Studied

All four countries recognize the strategic role of digital connectivity in advancing development, particularly for marginalized communities. However, systemic challenges persist in rural areas, such as inadequate infrastructure, high costs, and limited digital skills. Despite government-led initiatives to expand broadband infrastructure in each country, the effectiveness of these programs vary and are often

hindered by policy limitations and uneven implementation. While CCCIs are emerging as vital complements to state-led programs, their growth is often constrained by regulatory or financial challenges. Each country's unique socioeconomic, geographic, and institutional realities shape both the promise and limitations of these initiatives. Addressing these require tailored, inclusive, and sustainable policy approaches.

2.4.1 Common Development and Policy Contexts

There are common connectivity challenges faced by stakeholders in the four countries where the CCCIs studied are located. *Table 2.1* highlights the common connectivity challenges across Indonesia, India, Kenya, and South Africa.

Table 2.2. Development and Policy Contexts of the CCCIs Studied

Theme	Kasepuhan Ciptagelar (Indonesia)	Pathardi (India)	TandaNET (Kenya)	Zenzeleni (South Africa)
Rural-Urban Divide	Connectivity clustered in urban hubs	Rural areas lag behind in access	Urban-centric networks	Skewed rollout favoring urban areas
Digital Literacy Gaps	Gendered literacy divide, online harms	Low digital awareness, language barriers	Limited skills and low adoption in rural areas	High literacy in cities, lower in rural
Government-Led Initiatives	Palapa Ring, Village Law	BharatNet, PM WANI	National Broadband Strategy, MTP IV	SA Connect, NDP
Affordability Issues	Unequal bandwidth costs	High infrastructure and service costs	High device/ data costs	High cost of broadband and mobile data
Community Networks	Growing but restricted by regulation	Emerging but need scalable models	Supported via Tier 3 licensing	Mixed success, some regulatory support

2.4.2 Specific Contextual Challenges Faced by CCCIs

There are also specific contextual challenges faced by the CCCIs in the countries where they are situated. The specific contextual challenges faced by each of the CCCIs studied are provided below.

Kasepuhan Ciptagelar in West Java, Indonesia. Indonesia faces acute geographic challenges as an archipelago with over 18,000 islands. The emphasis on decentralization post-2001 has brought infrastructural gains, but indigenous communities remain excluded due to structural gaps in national policies like the Village Law. Stark gender disparities affect digital participation.

Pathardi, Maharshtra, Western India. India, despite having massive internet user growth, still grapples with the world's largest offline population. Its strength lies in multipronged federal initiatives like BharatNet and PM WANI, which aim at last-mile delivery. However, the lack of multilingual content and inclusive business models hinder deeper penetration, especially in linguistically diverse regions.

Kibera, Nairobi, Kenya. Kenya stands out for its "Silicon Savannah" branding and relatively progressive policy moves such as the affordable community network licensing. However, the benefits remain urban-centric. Continued community efforts, coupled with seed funding from social investors and enabling institutions and stronger digital literacy programs, are critical to expand affordable access in rural and informal settlements.

Mankosi and Zithulele villages, Eastern Cape, South Africa. South Africa has made substantial gains in national digital coverage but faces crippling cost and energy barriers. Policies like the SA Connect and spectrum reforms show government commitment, but institutional inefficiencies and uneven fund distribution (e.g., USAF) limit impact on community-led solutions.

2.5 Main Attributes of CCCIs

What makes CCCIs well-positioned to provide inclusive and transformational services? CCCIs are often locally governed, demand-driven, and bottom-up solutions tailored to community needs. Unlike commercial providers, they are uniquely positioned to deliver inclusive and transformational services due to their community-led governance, adaptability, and strong focus on local priorities. CCCIs prioritize affordability, sustainability, and digital literacy, ensuring that marginalized groups gain technical skills, create digital content,

and actively manage their own connectivity infrastructure.[67] This approach empowers communities as co-owners of their digital future rather than passive consumers, fostering long-term impact.

Beyond providing internet access, CCCIs act as catalysts for social transformation. They drive economic inclusion, improve access to education and healthcare, and help preserve cultural heritage. Whether supporting women entrepreneurs, facilitating Indigenous knowledge-sharing, expanding youth education, or extending rural broadband access, CCCIs bridge digital gaps while promoting empowerment and self-sufficiency. Their success underscores the power of community-led models to build equitable, sustainable digital ecosystems and enable underserved populations to fully participate in the digital world.[68] Table 2.1 shows the nature and key features of the CCCIs studied, which demonstrate these inclusive and transformational attributes.

Table 2.3. Nature and Key Features of the CCCIs Studied

CCCI	Location	Nature and Key Features
Kasepuhan Ciptagelar CCCI	Kasepuhan Ciptagelar in West Java, Indonesia	Indigenous-led initiative integrating local cultural values with affordable internet, fostering digital literacy, and enabling self-sustaining network management.
Pathardi CCCI	Pathardi, Maharshtra, Western India	Community-managed network serving seven tribal villages, featuring e-DOST for women entrepreneurs, cultural preservation initiatives, and an e-commerce platform with banking features for artisans and farmers.
TandaNET CCCI	Kibera, Nairobi, Kenya	Grassroots-driven initiative providing affordable connectivity, digital skills training, and advocacy for emerging CCCIs, focusing on schools, health clinics, and microenterprises.
Zenzeleni Networks	Mankosi and Zithulele villages, Eastern Cape South Africa	Cooperative-led ISP offering locally managed, low-cost internet services, supporting digital literacy, economic participation, and governance in underserved communities.

67 https://www.apc.org/en/pubs/typology-community-centred-connectivity-initiatives.

68 https://www.apc.org/en/pubs/principles-community-centred-connectivity-initiatives.

2.5.1 Shared Features, Stakeholder Engagement, and Sustainability Models of CCCIs

The four CCCIs—Kasepuhan Ciptagelar (Indonesia), Pathardi (India), TandaNET (Kenya), and Zenzeleni (South Africa) —share a common goal: bridging the digital divide in underserved communities while tailoring services and governance to local needs. Whether in a rural or urban setting, each operates in marginalized areas where infrastructure gaps, high costs, or policy constraints limit access to affordable internet.

Each initiative demonstrates these notable features in serving marginalized communities:

- **Kasepuhan Ciptagelar** integrates digital access with Indigenous governance and cultural preservation,
- **Pathardi** promotes tribal inclusion through women-led entrepreneurship and digital service delivery
- **TandaNET** adopts a grassroots approach centered on community governance, training, and advocacy, and
- **Zenzeleni** functions as a cooperative ISP, providing affordable, locally managed internet services in rural South Africa.

These features, along with the nature of stakeholder engagement and financial sustainability strategies, are summarized in Table 4.

Community stakeholders play a pivotal role in establishing, managing, and expanding each CCCI. In Kasepuhan Ciptagelar, indigenous leaders and youth lead efforts in digital literacy and governance. Pathardi empowers tribal women to become e-DOST service providers, combining entrepreneurship with digital inclusion. TandaNET mobilizes schools, microenterprises, and advocacy groups to promote digital access through localized training and capacity-building. In Zenzeleni, community cooperatives manage the ISP, with local technicians and entrepreneurs determining pricing, service quality, and expansion. These approaches reinforce community ownership and ensure long-term impact, differentiating CCCIs from traditional commercial providers.

Financial sustainability varies across the initiatives, each adopting innovative funding models suited to their economic context.

Kasepuhan Ciptagelar and Zenzeleni rely on pre-paid voucher systems and active community engagement to maintain services. Pathardi secures funding through annual grants allocated through the Gram Panchayat Development Plan, facilitating consistent service delivery to tribal communities. TandaNET blends low-cost subscriptions, donor support, and training programs, leveraging partnerships for sustainability. While these models enhance accessibility, long-term sustainability depends on expanding user bases, strengthening local capacities, and securing supportive policy frameworks. These conditions are critical for CCCIs to sustain and scale inclusive digital transformation in underserved regions.

Table 2.4. Features, Stakeholder Engagement, and Financial Sustainability Models of the CCCIs

CCCI	Features & Location	Stakeholder Engagement	Financial Sustainability Model
Kasepuhan Ciptagelar (Indonesia)	Indigenous-led digital initiative integrating cultural preservation, governance, and affordable connectivity in rural West Java.	Indigenous leaders, youth groups, and technicians manage and expand services, ensuring self-sustaining network operations.	Voucher-based sales model (i.e., prepaid internet vouchers) fund service expansion and local maintenance.
Pathardi (India)	Community-managed network serving tribal villages, focusing on women-led entrepreneurship and digital inclusion.	Tribal women (e-DOSTs) provide digital services, while local farmers and artisans engage in e-commerce expansion.	Annual grants via the Gram Panchayat Development Plan secure funding for operations, ensuring affordability for rural users.
TandaNET (Kenya)	Grassroots-driven initiative in Kibera, emphasizing capacity-building, advocacy, and movement-building for CCCIs.	Schools, microenterprises, and advocacy groups actively shape policies and service models to ensure community governance.	Mixed model: low-cost subscriptions, donor funding, and capacity-building grants sustain long-term operations.
Zenzeleni (South Africa)	Cooperative ISP offering locally managed, low-cost broadband access, supporting digital literacy and economic participation.	Community-led governance and cooperatives dictate pricing, infrastructure investments, and long-term network expansion.	Voucher-based sales model ensures affordable prepaid subscriptions, with reinvestment in local infrastructure and training.

These CCCIs demonstrate diverse approaches to digital inclusion, ensuring community engagement, localized governance, and financial sustainability to deliver equitable and scalable connectivity solutions.

2.5.2 Comparative Analysis of Transformational and Social Inclusion Services Across CCCIs

The four CCCIs—Kasepuhan Ciptagelar (Indonesia), Pathardi (India), TandaNET (Kenya), and Zenzeleni (South Africa)—offer a blend of transactional, social inclusion, and transformational services, each tailored to the unique needs of their communities. All four initiatives provide basic transactional services, such as internet connectivity, using models like voucher sales, subscriptions, or government-supported programs. They also offer essential digital services, including printing, scanning, and mobile banking, with Pathardi notably integrating an Aadhaar-enabled payment system and support for a wide range of utility payments.

While social inclusion is a shared priority, the CCCIs adopt varied approaches. Table 5 compares the common and distinct needs-based services across the four initiatives .

Digital literacy training is a common feature, equipping communities with basic computer skills and online safety awareness. However, Pathardi's e-DOST program and TandaNET's Women Engineers Program specifically target female digital entrepreneurship, promoting gender inclusion in the tech space. Local content creation and preservation also emerge as key strategies: Kasepuhan Ciptagelar focuses on Indigenous storytelling, Pathardi promotes tribal knowledge-sharing; and TandaNET supports audio content production. Zenzeleni distinguishes itself by providing computer hubs that offer shared digital access.

Transformational services focus on community governance, digital autonomy, and infrastructure sustainability. All CCCIs emphasize capacity building, but implement it differently: Kasepuhan Ciptagelar and Pathardi train local residents in network maintenance; TandaNET works on movement-building and mentoring emerging CCCIs nationwide; Zenzeleni prioritizes identifying and connecting underserved communities through cooperative management.

Kasepuhan Ciptagelar also uniquely features cultural media labs, enabling villagers to produce digital storytelling content and elevate indigenous voices in digital spaces.

This comparative analysis highlights shared strengths in providing connectivity and digital literacy, while also showcasing how each CCCI tailors its services to address local needs, such as gender inclusion, indigenous representation, and community-led governance. Strengthening transformational services across all CCCIs—through stronger governance, policy engagement, and infrastructure support—will help deepen their impact and ensure the growth of sustainable and equitable digital ecosystems.

Table 2.5. Comparison of Common and Distinct Needs-based Services Across CCCIs

Service Type	Common Services Across CCCIs	Distinct Needs based Services Per CCCI
Transactional	Internet access via vouchers/subscriptions Printing/scanning services Online financial transactions	**Pathardi:** Aadhaar-enabled payment banking system (AePs), utility payments **TandaNET:** Cloud storage & hosting services
Social Inclusion	Digital literacy training Local content development (audio, video, storytelling)	**Pathardi:** e-DOST female entrepreneurship **TandaNET:** Women Engineers Program **Zenzeleni:** Community computer hubs
Transformational	Capacity building for governance and network maintenance Digital advocacy and movement-building	**Kasepuhan Ciptagelar:** Cultural media labs **Zenzeleni:** Identification and connection of underserved communities **TandaNET:** Mentorship for new CCCIs nationally

2.5.3 Key Issues and Constraints Affecting Social Inclusion and Transformational Services

Despite their strengths and ability to innovate around challenges, CCCIs grapple with issues and investment constraints that limit the depth of their social inclusion and transformational services. Table 2.1 outlines the key issues and constraints faced by the CCCIs studied.

Table 2.6. Key Issues and Constraints Faced by CCCIs

CCCI	Key Issues and Constraints Faced
Kasepuhan Ciptagelar (Indonesia)	• Structural marginalization of Indigenous communities limits access to resources and governance rights under national policies • Limited digital literacy contributes to misinformation, fraud, and gender-based barriers in online engagement • High disparity in bandwidth costs between urban centers and rural areas, restricting affordable access
Pathardi (India)	• Rural connectivity challenges due to topography, low population density, and unreliable power affect digital inclusion • Gender disparity and digital literacy gaps limit women's representation and participation in online services • Limited localized content in multiple languages hinders engagement for Indigenous and tribal communities
TandaNET (Kenya)	• Uneven digital coverage, particularly in informal settlements, prevents widespread connectivity and adoption, implying investments needed in more hotspot infrastructure • Affordability constraints make access to smartphones, internet, and digital tools difficult for low-income users • Cybersecurity concerns (fraud, cyberbullying, misinformation) pose risks to safe digital participation
Zenzeleni (South Africa)	• Rural broadband expansion remains limited, leaving community-led networks struggling with infrastructure gaps • High internet costs restrict affordability for lower-income groups, hindering transformational access • Energy instability (load shedding) disrupts connectivity, affecting digital learning, healthcare, and economic participation.

While efforts are underway to expand connectivity, reduce costs, and address cybersecurity risks, sustained progress requires continued policy advocacy, targeted capacity-building, and strategic infrastructure investment. These actions are essential to ensure equitable and sustainable digital empowerment for underserved populations.

2.6 Initiating the Use of Development Indexing to Measure Social Impact

The four case reports highlight the outcomes of their respective connectivity initiatives as attested by stakeholders and key informants. Through these cases, essential elements, parameters,

and criteria for effectively measuring social impact were identified. These insights formed the foundation for developing a Development Index (DI), a tool designed to systematically evaluate CCCIs or community networks as social enterprises operating within the digital economy.

For each of the CCCIs studied, an initial DI framework and a matrix was developed based on observed outcomes. The four CCCI DI matrices served as input for evolving the elements of a proposed development index tailored to CCCIs. Given time and resource constraints, the case studies focused on defining key result areas, sub-elements, and performance indicators of social impacts deemed significant that may serve as basis for evolving a fully weighted scorecard in a follow-up CCCI DI study.

2.6.1 Major Themes of Key Result Areas (KRAs) and Performance Indicators (PIs) Across CCCIs

The four CCCIs, Kasepuhan Ciptagelar (Indonesia), Pathardi (India), TandaNET (Kenya), and Zenzeleni (South Africa), share several common Key Result Areas (KRAs), while also reflecting unique priorities shaped by their local contexts and stakeholder needs. Four major themes consistently emerged across these initiatives: **Economic Development, Inclusive Human Development, Environment and Climate Action and Digital Governance and Community Empowerment**.

In addition to these common themes, one or two CCCIs generated distinct KRAs and performance indicators (PIs) that addressed specific community challenges and goals as shown by the following:

- Kasepuhan Ciptagelar's focus on cultural identity and heritage
- Pathardi's emphasis on gender-inclusive entrepreneurship, particularly in engaging tribal women to participate in their e-DOST program.
- TandaNET's prioritization of women's empowerment and environmental awareness, with strong advocacy components.
- Zenzeleni's highlighting the expansion of digital community networks and inclusive governance in cooperative models.

Table 2.1 summarizes the main themes in terms of KRAs and PIs from all four CCCIs. The summary reveals two key findings relevant to assessing the social impact of CCCIs. First, there are common and essential KRAs and significant PIs that consistently contribute to social impact among marginalized stakeholders. Second, these shared KRAs and PIs can serve as the foundation for developing a standardized Development Index template for CCCIs, while still allowing for customization based on specific local contexts. For example, while all CCCIs may share the six KRAs, those serving indigenous communities (as exemplified by Kasepuhan Ciptagelar and Pathardi) or rural communities (as exemplified by Zenzeleni) may have a different set of performance indicators from CCCIs serving urban slums (as exemplified by Tandanet).

Table 2.7. Common and Differentiated Key Result Areas of the Four CCCIs

	Main Headings / Themes of a Prototype DI Template	Full KRA Statement	Number of Significant PIs	No. of PIs monetized	Remarks
1	Economic development of the marginalized	**Improvement in the economic conditions of the community stakeholders**	14	7	Common to all 4 CCCIs
2a	Community empowerment	Increased levels and capacities for inclusive human development and **community empowerment**	17	6	Common to Kasepuhan Ciptagelar & Pathardi
2b	Holistic human development	Improved levels and capacities for inclusive and holistic human development	15	13	Common to TandaNET& Zenzeleni but PIs from Kasepuhan Ciptagelar & Pathardi were identified along human development
3a	Environment (conservation, biodiversity)	Increased levels and **capacities for conservation and development of agricultural or ancestral lands** and biodiversity	2	1	Distinct to Pathardi

	Main Headings / Themes of a Prototype DI Template	Full KRA Statement	Number of Significant PIs	No. of PIs monetized	Remarks
3b	Environment (awareness & action)	Increase in **awareness and action on environmental** issues and concerns	2	1	Distinct to TandaNET
3c	Adaption to climate-related disasters	Better **adaption of community to climate-related disasters**	7	2	Distinct to Kasepuhan Ciptagelar
4a	Digital governance	Empowerment of **community to own, govern, and manage** internet and digital resources	14	12	Common to 2 CCCIs
4b	Enabling environment for community networks	Improved **enabling environment** for Community Networks	4	1	Distinct to TandaNET
5	Women	Inclusion and **empowerment of women** as stakeholders in digital transformation	5	4	Common to 2 CCCIs; Mentioned in 2 sub-elements in Pathardi Significant PI for Kasepuhan Ciptagelar
6	Cultural identity & heritage	More effective preservation of cultural integrity, identity, and heritage	5	1	Common to 2 CCCIs
			85	40	

2.6.2 Potential KRAs and PIs for a Proposed CCCI Development Index

Upon further distillation of the themes reflected in the KRA statements of the four CCCIs and the underlying intent of their respective PIs, and giving due importance to certain elements that merit distinct emphasis, the KRAs may be synthesized into six (6) key result areas:

- Improvement in the economic position and conditions of community stakeholders
- Increased levels and capacities for inclusive human development
- Increased levels and capacities for climate action and natural resource management
- Empowerment of community to control, govern, and manage internet and digital resources
- Inclusion and empowerment of women as stakeholders in digital transformation
- More effective preservation of the cultural identity, heritage, and integrity of the community

As can be seen from this synthesis of six KRAs, empowerment of the community to control, govern and manage internet and digital resources has been given due importance as a distinct KRA from inclusive human development. The inclusion and empowerment of women as stakeholders of digital transformation has also been given due importance as a distinct KRA, rather than just being included as a set of performance indicators impacting on women as stakeholders under various KRAs such as improved economic position, inclusive human development and community empowerment.

Based on the four case studies of Kasepuhan Ciptagelar (Indonesia), Pathardi (India), TandaNET (Kenya), and Zenzeleni (South Africa), Table 8 presents a potential set of PIs under these six KRAs that can make up the DI template for CCCIs. For brevity, duplicate or similar PIs have been consolidated. Each CCCI wanting to use the DI template may choose the performance indicators that may be most appropriate or even create new performance indicators.

Table 2.8. Potential KRAs and PIs of a Proposed Development Index for CCCIs

Potential Key Result Areas (KRAs)	Potential Performance Indicators (PIs)
1 Increased levels and capacities for inclusive human development	1. Greater knowledge to achieve good health and wellbeing (e.g. health news and advisory, entertainment) 2. Better capability to develop technical skills and special interests (e.g. recipes, home design, farming technologies) 3. Greater achievement in formal education 4. Faster and cheaper communication and coordination with the use of new digital technology 5. Greater cost efficiency in undertaking day to day tasks and activities (e.g. reduced travel time and expenses) 6. More enhanced social relations within households or among community members 7. Heightened political awareness and/or engagement 8. Better capacity to promote social order and fight unacceptable behavior (e.g. disinformation, scams) 9. Increased involvement of youth as farmers (inter-generational sustainability of farming)
2 Improvement in the economic position and conditions of community stakeholders	1. Increase in household assets (e.g. motorcycles, gadgets, home improvements) 2. Increase in financial resources to support consumption or avoid over borrowing 3. Increase in trade or transactions (traditional or online) of existing microentrepreneurs 4. Increase in employment generation 5. Improved capability to use adaptive farming techniques integrating traditional and new technologies 6. Development of capacity to generate or increase income from new economic activities (e-jobs) 7. Development or increase in capacity of community stakeholders to save (e.g. through opening of bank accounts) 8. Development of community stakeholders as entrepreneurs in the digital economy 9. Increased income resulting from improved productivity and sales through online platforms
3 More effective preservation of the cultural identity, heritage, and integrity of the community	1. More effective documentation of indigenous or local cultural activities and practices, archive records, and sharing with younger generations 2. Improved capacity to produce and upload online content (images, videos, audio recordings of local or indigenous knowledge, activities, events) 3. Increase in societal awareness on indigenous people and local communities (through increased sharing of locally-produced education and information materials with other communities and academic groups) 4. Improved capacity to establish ancestral land rights (e.g. land mapping) for policy reform

Potential Key Result Areas (KRAs)	Potential Performance Indicators (PIs)
4 Increased levels and capacities for climate action and natural resource management	1. Higher citizens' participation in generating and validating data from the ground 2. More reliable and timely information dissemination with modern devices 3. More proactive risk management through dissemination of risk information, hazard models, and vulnerability data 4. Improved capability to avoid or minimize loss of lives and property amid disasters 5. Greater awareness on climate challenges and disaster preparedness 6. Broader reach of information for resource mobilization and improved access to appropriate assistance to recover and rebuild post disaster 7. Improved capacity to preserve, develop and propagate indigenous seed varieties 8. Improved capacity for crop diversification and increasing agricultural productivity 9. Increased engagement (e.g. through social media and online platforms) of community members on environmental issues and action
5 Empowerment of community to control, govern, and manage internet and digital resources	1. Number and percentage of community representatives in management and governance positions in community networks (CNs) or CCCIs 2. Number of community members serving as staff/ technicians of CNs or CCCIs 3. Number of CNs/CCCIs established and developed serving new unconnected or underserved communities 4. Improved or increased capacity of new CNs/ CCCIs to sustain their operations 5. Development of community-based institutions or groups with capability to govern and manage internet and digital resources 6. Increase in government resources effectively deployed to support existing and new CNs/CCCIs
6 Inclusion and empowerment of women as stakeholders in digital transformation	1. Number and percentage of women occupying governance, management, and technical positions in CNs/CCCIs 2. Increase in the number of women beneficiaries and organizations inquiring and reporting cases of online gender-based violence 3. Increase in awareness and action on gender issues and women's rights in the digital space 4. Enhanced participation and capacities of women in governance and management of digital resources 5. Increase in income gained by new women entrants as leaders and technicians of CNs/CCCIs

KRA 1: **Increased levels and capacities for inclusive human development.** This focuses on enhancing individual and community well-being through improved knowledge, skills, education, social cohesion, and political participation. Common PIs include greater health and well-being awareness, achievement in formal education, development of technical and life skills, and strengthened social relations. Less common PIs in this KRA are the emphasis on faster, cheaper communication enabled by digital technologies, heightened political awareness, and community empowerment to promote social order and combat misinformation (as in the case of Kasepuhan Ciptagelar), reflecting the integration of digital tools in fostering inclusive development.

KRA 2: **Improvement in the economic position and conditions of community stakeholders.** This centers on economic empowerment through asset accumulation, business growth, employment generation, sustainable agricultural practices, and financial inclusion. Common PIs include increases in household assets, income, employment, and savings, as well as adoption of adaptive farming techniques. Unique to this KRA is the measurement of participation in the digital economy, such as employment in e-jobs and entrepreneurship through online platforms (TandaNET), highlighting the role of digital transformation in advancing economic conditions.

KRA 3: **More effective preservation of the cultural identity, heritage, and integrity of the community.** This emphasizes safeguarding and promoting local knowledge, cultural heritage, and indigenous rights. Common PIs involve improved capacities in the documentation and sharing of local knowledge and culture. A distinct set of PIs under this KRA is the use of digital tools to produce and disseminate cultural content online (as in the case of Pathardi) and the strategic use of land mapping to support indigenous land rights advocacy (as manifested in the case of Kasepuhan Ciptagelar), reflecting the intersection of cultural preservation and technology specially among indigenous and tribal communities as stakeholders of CCCIs. For non-indigenous communities, the PIs under this KRA may be focused on the development and dissemination of local knowledge and culture.

KRA 4: **Increased levels and capacities for climate action and natural resource management.** This aims to build community resilience through enhanced communication for disaster response, proactive risk management, biodiversity conservation, and climate education. Common PIs include timely dissemination of hazard information, improved disaster preparedness, and crop diversification. Unique to this KRA is the active engagement of community members on social media platforms regarding environmental issues (as manifested in the case of TandaNET) and the systematic preservation and propagation of indigenous seed varieties (as shown by the case of Pathardi), demonstrating a blend of traditional knowledge and modern communication.

KRA 5: **Empowerment of community to control, govern, and manage internet and digital resources.** This focuses on building local governance, technical capacity, and sustainable management of digital infrastructure and resources. Common PIs include the number of community representatives in governance roles, staffing of community networks by locals, and the establishment and sustainability of community networks serving underserved areas. For TandaNET and Zenzeleni, there is distinct emphasis on the development of community-based institutions and leadership specifically geared toward digital resource management, underscoring the importance of local ownership in digital inclusion. In the case of Kasepuhan Ciptagelar and Pathardi, the capability of the village authority or government to govern and manage digital resources was developed.

KRA 6: **Inclusion and empowerment of women as stakeholders in digital transformation.** This highlights increasing women's participation, leadership, and protection in digital spaces while also manifesting economic empowerment alongside social inclusion in the digital transformation process. TandaNET and Zenzeleni have separate and dedicated KRAs on the inclusion and empowerment of women as stakeholders in digital transformation. Common PIs cover women's representation in governance and technical roles within the CCCIs or community networks. PIs manifested by one or more of the CCCIs include increased reporting and awareness of online gender-based violence and income gains and leadership opportunities for women as new entrants in digital initiatives.

2.7 Social Return on Investments (SROI): Findings and Indications of Cost-Effectiveness

The Social Return on Investment (SROI) analysis of the four CCCIs was undertaken following the identification of KRAs and significant PIs for each case. The analysis demonstrates growing cost-effectiveness and long-term social impact. By quantifying and monetizing the most significant outcomes, the findings reveal how these initiatives have enhanced digital inclusion, economic empowerment, local governance, and social equity in marginalized communities. Each CCCI exhibits unique strategies for sustainability, ranging from voucher-based sales and cooperative-led ISPs to gender-inclusive entrepreneurship and policy advocacy, resulting in increasing SROI ratios over time. This integrative analysis synthesizes their distinct approaches, illustrating how community-driven connectivity models serve as effective and scalable social enterprises that bridge the digital divide.

Table 2.1 provides the annual SROI ratios, and the corresponding stakeholder or beneficiary count, cost of inputs and aggregate monetized outcomes for years 1 to 4 from the SROI analyses conducted for the four CCCI cases.

Table 2.9. Annual SROI Ratios and Relevant Data from the SROI Analysis of the CCCI Cases

CCCI	Stakeholder/Beneficiary Count				SROI Ratios			
	Year 1	Year 2	Year 3	Year 4	Year 1	Year 2	Year 3	Year 4
Kasepuhan Ciptagelar (Indonesia)	8,665	9,548	9,912	10,290	1.45	1.62	2.51	2.89
Pathardi CCCI (India)	6,240	6,300	6,300		1.23	3.25	8.19	
TandaNET (Kenya)	3,409	5,678	5,723		1.50	1.72	4.88	
Zenzeleni (South Africa)	886	1,095	1,377		1.17	2.89	3.62	
CCCI	**Cost of Inputs (in US$)**				**Aggregate Monetized Outcomes (in US$)**			
Kasepuhan Ciptagelar (Indonesia)	115,535	127,085	120,244	113,557	167,129	205,565	301,340	328,425
Pathardi CCCI (India)	48,612	18,870	13,243		59,701	61,251	108,446	
TandaNET (Kenya)	81,393	76,854	34,363		122,382	132,353	167,570	
Zenzeleni (South Africa)	32,037	18,113	19,442		37,573	52,372	70,354	

2.7.1 Analysis of the SROI Ratios of the Four CCCIs

The SROI ratios across the four CCCIs demonstrate varying levels of cost-effectiveness and long-term social impact. Overall, they reflect a progressive increase in cost-effectiveness, highlighting the capacity of CCCIs to generate greater financial and social returns on investment over time. Year 1 ratios for all the CCCIs were more than 1, indicating gains at the end of the initial year.

As shown in Table 10, among the four CCCIs, Pathardi leads with the highest year-on-year growth rate of 164.23% from year 1 to 2 and 152% from year 2 to 3. Zenzeleni CCCI grew by 147% from year 1 to 2 and slowed down to 25.26% from year 2 to 3. From year 1 to 2, the SROI of TandaNET CCCI grew by 14.67%, then surged to 184% from year 2 to 3. The SROI ratio of Kasepuhan Ciptagelar CCCI grew by 11.72% from year 1 to 2 and by 55% from year 2 to 3.

Table 2.10. Annual SROI Ratios of CCCIs and Year-on-Year Growth Rate

CCCI	SROI Ratios				Year 1 to 2	Year 2 to 3
	Year 1	Year 2	Year 3	Year 4	Growth rate	Growth rate
Kasepuhan Ciptagelar (Indonesia)	1.45	1.62	2.51	2.89	11.72%	54.94%
Pathardi CCCI (India)	1.23	3.25	8.19		164.23%	152%
TandaNET (Kenya)	1.50	1.72	4.88		14.67%	183.72%
Zenzeleni (South Africa)	1.17	2.89	3.62		147%	25.26%

The SROI trends showing year-on-year growth in impact indicate a positive trajectory across all CCCIs, reinforcing the long-term sustainability of community-driven digital inclusion initiatives. The Pathardi case, in particular, showcases a rapid escalation in returns, climbing from 1.23 in Year 1 to 8.19 in Year 3. This reflects the effectiveness of targeted local governance and empowerment programs. Similar upward trends in TandaNET and Zenzeleni demonstrate the scalability of cooperative and grassroots connectivity models, highlighting their role as viable alternatives to commercial ISPs in underserved communities.

The details of the SROI Summary per CCCI which provide the relevant data supporting the SROI ratios presented in this section, are presented in Annex 1. SROI Sumary Per CCCI.

Overall, the consolidated analysis affirms the effectiveness of CCCIs as social enterprises, demonstrating that investing in digital equity and localized governance models yields high social and financial returns. The data further underscores the importance of long-term financial sustainability, stakeholder engagement, and adaptive service models in maximizing impact. Strengthening cross-regional learning and policy integration among CCCIs could further enhance cost-efficiency and scalability, ensuring continued growth in digital inclusion for marginalized communities.

2.7.2 Factors Affecting the SROI Ratios

Across the four cases, several significant PIs were not monetized for inclusion in the SROI analysis. As such, the SROI ratios generated may be generally understated. It is thus important to analyze the types of impact that were monetized and not monetized.

Table 2.1 shows a comparison of the quantified/monetized and not quantified/unmonetized significant PIs across the four CCCIs studied.

Table 2.11. Summary of Significant PIs per CCCI that were Quantified/ Monetized vs Unquantified/ Not Monetized

CCCI	Quantified / Monetized PIs	Not Quantified / Unmonetized PIs
Kasepuhan Ciptagelar (Indonesia)	• Savings from improved post-disaster recovery assistance • Increased income for micro-entrepreneurs • Enhanced employment generation • Cost savings from faster communication and reduced travel • Greater awareness of Indigenous existence through cultural advocacy	• More proactive climate risk management • Improved Indigenous knowledge documentation • Strengthened social cohesion and political participation • Expanded local governance capacity • Increase in household financial stability

CCCI	Quantified / Monetized PIs	Not Quantified / Unmonetized PIs
Pathardi (India)	• Increased earnings from e-DOST women entrepreneurs • Growth in online agricultural and tribal product markets • Savings generated by digital banking and financial transactions • Cost reductions in accessing essential government services	• Higher acceptance and respect for women entrepreneurs • Expanded networking opportunities among small farmers • Strengthened technical capacity to maintain internet infrastructure • Increased participation of senior citizens in the digital economy
TandaNET (Kenya)	• Income generation through online employment (clerical work, e-commerce) • Cost savings for schools and businesses through cheaper connectivity • Reduced healthcare costs due to better digital access • Savings on digital advocacy training and policy engagement	• Increased awareness and action on environmental sustainability • Expanded digital inclusion in mental health support • Safer learning environments for youth during COVID-19 • Growth in women-led governance within the CCCI ecosystem
Zenzeleni (South Africa)	• Revenue generation from ISP voucher sales • Cost reductions in education materials for students • Increased digital workforce employment and skills development • Savings from localized digital literacy programs	• Improved effectiveness in governance participation • Strengthened access to digital healthcare services • Enhanced community-driven ISP expansion • Increased engagement in cultural preservation activities

In reviewing the monetized and non-monetized indicators across the four cases, it may be useful to point out the following:

- Most monetized indicators relate to financial savings, employment creation, and reduced cost to the end user, reflecting measurable economic benefits of CCCIs. Case in point, Zenzeleni and TandaNET show strong monetization in ISP revenue models.
- Unmonetized indicators often pertain to governance, cultural preservation, gender empowerment, and environmental sustainability, suggesting the need for improved social impact measurement frameworks. For example, Kasepuhan Ciptagelar and Pathardi display more intangible cultural and governance impacts, reinforcing the importance of non-financial evaluation metrics.

CCCIs generate both quantifiable and intangible social benefits. Direct financial savings and revenue growth can easily be monetized, while social, educational, and governance-related improvements that are more inclusive and transformative remain difficult to quantify.

There are several factors affecting monetization of PIs and KRAs. Time and resource constraints affected the length and quality of engagement of case researchers in probing appropriate monetary proxies. This also limited the capacity of case researchers to be on the ground for richer and more interactive face-to-face engagements with the stakeholders. Beyond time and resource constraints, there are difficulties in finding financial proxies for intangible outcomes specially in developing country contexts.

Annex 2 provides the details of the means of monetization (how the performance indicators were monetized) that were used per performance indicator for each of the CCCIs studied.

2.7.3 Insights on the SROI Analysis

The results of the SROI analyses of the four CCCIs, where ratios consistently exceeded one across all initiatives, demonstrate their cost-effectiveness. This shows that CCCIs are generating greater financial and social returns compared to their initial investments, reinforcing their sustainability as community-driven connectivity enterprises. However, these ratios may be understated, as not all significant social impacts, such as cultural preservation, empowerment, and environmental sustainability, have been fully monetized. Nonetheless, the consistent increase in SROI ratios over consecutive years indicates the progressive growth of social value and highlights how CCCIs are continually enhancing their impact through increased stakeholder engagement, service diversification, and adaptive governance models. These findings emphasize the growing potential for CCCIs to serve as scalable solutions for digital inclusion, warranting further investment and policy support.

2.8 Conclusion

CCCIs play a transformative role in bridging the digital divide by offering social inclusion and transformational services that extend beyond the capabilities of commercial ISPs. They facilitate meaningful digital access, ensuring that marginalized communities access and benefit from economic empowerment, governance participation, cultural preservation, and climate resilience. The impacts generated by CCCIs strongly align with key development priorities, including:

- Increased levels and capacities for inclusive human development;
- Improvement in the economic position and conditions of community stakeholders;
- More effective preservation of the cultural identity, heritage, and integrity of the community;
- Increased levels and capacities for climate action and natural resource management;
- Empowerment of community to control, govern, and manage internet and digital resources; and
- Inclusion and empowerment of women as stakeholders in digital transformation.

The positive and increasing SROI ratios across the four CCCIs demonstrate their long-term sustainability and effectiveness, proving that these models efficiently increase financial and social value over time. As their impacts continue to grow, CCCIs emerge as cost-effective solutions for expanding digital equity, reinforcing their role as essential pillars in community-led connectivity and governance. Strengthening funding mechanisms, stakeholder engagement, and policy integration will be critical in improving their scalability and ensuring their lasting success.

2.9 Annex 1. SROI Sumary Per CCCI

The tables below (*Table 2.4* to *Table 2.7*) present the SROI summary per CCCI.

Table 2.12. SROI Summary for Kasepuhan Ciptagelar CCCI

Outcomes	2020	2021	2022	2023
A. Financial Outcome: Net income of Kasepuhan Ciptagelar CCCI	$49,569.57	$9,256.57	$39,291.77	$37,135.07
B. Social Outcomes				
Increase in business transactions and new business enterprises	$7,535.39	$22,606.18	$68,097.75	$90,424.71
Instilled pride in following the desires of their ancestors	$28,242.45	$56,484.90	$65,899.05	$75,313.20
Savings on health services, consequent to not having positive cases	$12,356.53	$12,356.53	$12,356.25	$0.00
Better access to government's rehabilitation assistance	$23,716.43	$23,716.43	$23,717.05	$23,716.43
Better access to more appropriate assistance	$15,000.00	$15,000.00	$15,000.00	$15,000.00
Improved access to learning materials	$8,750.00	$17,500.00	$20,416.67	$23,333.33
Income generation for new online resellers	$4,233.57	$12,700.71	$14,742.00	$16,934.28
Increase in savings from not having to travel back to families	$11,100.00	$22,200.00	$25,900.00	$29,600.00
Increase in savings from not spending on the old telecommunications services (e.g., internet shops)	$8,750.00	$17,500.00	$20,416.67	$23,333.33
Sedentary lifestyle and lack of social and life skills affecting 4/10 of children	($696.00)	($2,088.00)	($2,784.00)	($4,640.00)
Aggregate Outcomes	$167,129.06	$205,565.19	$301,339.55	$328,425.36
Aggregate Inputs	$115,535.33	$127,085.12	$120,243.79	$113,557.14
SROI Ratio	1.45	1.62	2.51	2.89

Table 2.13. SROI Summary for Pathardi CCCI

Social Outcomes: Performance Indicators	2020	2021	2022
Transportation costs saved and wages earned at work by villagers	$46,847.62	$46,947.60	$86,500.95
Started earning or increased earnings of the tribal women	$137.98	$125.43	$104.47
Turnover of digital service transactions processed by tribal women	$2,467.50	$1,930.44	$1,592.43
Increase in yield per hectare by the small farmers	$9,559.44	$11,559.15	$19,559.52
Increased income from new online customers by the Warli artists	$688.50	$688.50	$688.50
Aggregate Outcomes	$59,701.03	$61,251.12	$108,445.88
Aggregate Inputs	$48,612.25	$18,870.16	$13,242.49
SROI Ratio	1.23	3.25	8.19

Table 2.14. SROI Summary for TandaNET CCCI

Outcome: KRAs/Performance Indicators	2021-22	2022-23	2023-24
KRA #1: Improvement in the economic position and conditions of community stakeholders			
PI 1: Number of community stakeholders employed in e-jobs and have become entrepreneurs in the digital economy	-	-	-
PI 2: Increased income from employment and sales resulting from use of online platforms	82,822.50	82,822.50	115,951.50
KRA #2: Improved levels and capacities for inclusive and holistic human development			
PI 1: Faster, more affordable, and more effective access and utilization of updated teaching materials through online research	447.85	447.85	447.85
PI 2: Improved access and use of digital educational resources by community schools and students (cheaper cost of education materials)	2,270.00	2,270.00	2,270.00

Outcome: KRAs/Performance Indicators	2021-22	2022-23	2023-24
PI 3: Safer learning environment during the COVID-19 pandemic through online classes	-	-	-
PI 4: Improved capacity to deliver appropriate mental health information, education, and services online	5,622.72	176.84	8,943.72
PI 5: Increased number of children effectively immunized based on health standards and required protocols (Note: Better monitoring of immunization schedule)	1,818.16	1,818.16	1,818.16
PI 6: Faster and more affordable way of reports and orders submission from the centers' branches to the head office through the online facility	85.08	85.08	85.08
KRA #3: Increase in awareness and action on environmental issues and concerns			
PI 1: Increase in social media engagement of community members on environmental issues and concerns	6,468.00	6,468.00	6,468.00
PI 2: Increase in enrollment or engagement in online environmental courses and actions	-	-	-
KRA #4: Empowerment of community to own, govern, and manage internet and digital resources			
PI 1: Number of community-based organizations and individuals that are engaged in the governance, management, and operation of the Tanda CN in Kibera	1,472.40	1,472.40	1,472.40
PI 2: Share / increase in share in the digital market of CN	-	-	-
PI 3: Percentage / increase in percentage of community representatives occupying management and governance positions in the CN	8,834.40	8,834.40	8,834.40
PI 4:Number of community members serving as staff / technicians of CNs	14,135.04	14,135.04	14,135.04
PI 5: Number of CNs established and developed serving new unconnected and underserved communities beyond Kibera	1,052.70	1,052.70	1,052.70

Outcome: KRAs/Performance Indicators	2021-22	2022-23	2023-24
KRA #5: Inclusion and empowerment of women as stakeholders in digital transformation			
PI 1: Increase in the number of women beneficiaries and organizations inquiring and reporting cases of online gender-based violence	-	6,765.00	6,765.00
PI 2: Number and percentage of women occupying governance, management, and technical positions in CNs	981.60	981.60	981.60
PI 3: Increase in awareness and action on gender issues and practice of women's rights in the digital space	-	3,555.57	3,555.57
KRA #6: Improved enabling environment for Community Networks			
PI 1:Increase in the number and capacity of CNs serving unconnected and underserved communities	654.40	654.40	654.40
PI 2: Improved or increased capacity of new CNs to sustain their operations	-	-	-
PI 3: Number of new CNs and community stakeholders reached as a result of policies and programs of the government	-	-	-
PI 4: Resources effectively deployed to support existing and new CNs resulting to increase in the number and quality of outreach among unconnected communities	-	-	-
Monetized Outcomes (Net income gain, cost savings)	126,664.85	136,985.43	173,435.42
Present value of each year	122,381.50	132,353.07	167,570.45
Total Present Value (PV)	122,381.50	132,353.07	167,570.45
• **Investment Cost** • **Tandanet Operating Expenses** • **APC & others** (the Internet Society, the Collaboration on International ICT Policy for East and Southern Africa (CIPESA), Deutsche Welle, the Center for Youth Development, and the Massachusetts Institute of Technology (integrated in investment cost)	81,393.40	76,854.40	34,363.40
TOTAL COST	81,393.40	76,854.40	34,363.40
Net Present Value (PV minus the investment)	40,988.10	55,498.67	133,207.05
Social Return (Value per amount invested)	**1.50**	**1.72**	**4.88**

Table 2.15. SROI Summary for Zenzeleni CCCI

Outcome: KRAs/Performance Indicators	2021-22	2022-23	2023-24
KRA #1: Empowerment of community to own, govern, and manage internet and digital resources			
PI 1: Development of community-based institutions, groups, leaders and technicians with capability to govern and manage internet and digital resources, to build new CCCIs and to expand to new communities	8,737.46	8,287.77	9,883.70
PI 2: Improved capacity of community to develop, disseminate, and use local information, education, and communication materials	-	-	-
PI-3 Increase/expansion in the establishment of CCCIs serving other rural communities	1,112.80	3,240.78	4,651.11
KRA #2: Increased levels and capacities for inclusive and holistic human development			
PI 1: Increased utilization of government and other services accessed through the internet	7,750.00	4,958.40	3,917.18
PI 2: Increase of youth applying, enrolling, and graduating in various higher educational institutions	3,875.79	7,546.28	9,564.25
PI 3: Increased effectiveness and efficiency in accessing educational resources by students	9,729.87	18,463.11	29,707.27
PI 4: Improved effectiveness and efficiency in availing of quality healthcare services	-	-	-
KRA #3: Improvement in the economic position and conditions of community stakeholders			
PI 1: Increase in the number of community members securing new jobs in and becoming new entrepreneurs of the digital economy	5,010.00	7,700.00	11,083.99
PI 2: Increased income resulting from improved quality of employment and sales through online platforms – Significant but not quantifiable	-	-	-
KRA #4: Increased inclusion of women as stakeholders in digital transformation			
PI 1: Enhanced participation and capacities of women in the governance and management of digital resources (significant but not quantifiable; no baseline information established)	-	-	-
PI 2: New women as leaders and technicians in CCCIs	2,672.51	4,008.77	4,008.77
Monetized Outcomes (Net income gain, cost savings)	38,888.44	54,205.10	72,816.27
Present value of each year	37,573.37	52,372.08	70,353.88
Total Present Value (PV)	37,573.37	52,372.08	70,353.88

Outcome: KRAs/Performance Indicators	2021-22	2022-23	2023-24
Investment Cost: Zenzeleni Operating Expenses	$2,102.70	1,514.15	4,024.00
APC Outlay	29,934.42	16,598.67	15,417.90
TOTAL COST	$32,037.12	$18,112.82	$19,441.90
Net Present Value (PV minus the investment)	$5,536.25	$34,259.26	$50,911.98
Social Return (Value per amount invested)	1.17	2.89	3.62
Total count of stakeholders	886	1,095	1,377
Monetary Value / stakeholder	$6.24	$31.28	$37.00

2.10 Annex 2. Monetization of Impact

Table 2.1 to *Table 2.4* show the Monetization of Impact per CCCI case.

Table 2.16. Monetization of Impact – Kasepuhan Ciptagelar CCCI (Indonesia)

Performance Indicator & Stakeholder Count	KRA (or Link to KRA)	Monetization
Increase in business transactions and new enterprises (12–145 beneficiaries)	Economic Conditions of Community Stakeholders	Estimated income per business transaction x women population x 25% involved in trade/ business
Income generation for new online resellers (24–96 beneficiaries)		Average reseller income x marginal increase in users
Savings on health services due to lack of COVID-19 cases (3,954 beneficiaries)	Inclusive Human Development and Community Empowerment	Cost savings per avoided treatment x positivity rate (13.3%) in West Java
Improved access to learning materials (75–200 beneficiaries)		Estimated cost savings on travel for accessing educational resources
Increased savings from reduced travel for family visits (300–800 beneficiaries)		Estimated travel costs saved per person annually
Better access to government rehabilitation assistance (3,865 beneficiaries)	Climate Adaptation & Disaster Resilience	Cost of emergency kits x disaster risk rate x percentage of survivors needing aid
Instilled pride in following ancestral traditions (300–800 beneficiaries)	Cultural Integrity, Identity, and Heritage	Estimated cost of cultural celebrations x cumulative users

Table 2.17. Monetization of Impact – Pathardi CCCI (India)

Performance Indicator & Stakeholder Count	KRA (or Link to KRA)	Monetization
Easy and convenient access to digital services (5,796–46,000 beneficiaries)	Inclusive Human Development and Community Empowerment	Transportation costs saved + wages retained from avoiding unnecessary travel
Improved economic well-being and social standing (7 e-DOSTs)		Earnings of tribal women in digital service roles
Empowering women in digital literacy and communication skills (7 e-DOSTs)	Economic Position & Conditions of Stakeholders	Turnover of digital service transactions handled by e-DOSTs
Conservation of agro-biodiversity and improved land productivity (480 beneficiaries)	Agricultural & Ancestral Land Conservation	Increase in crop yield per hectare

Table 2.18. Monetization of Impact – TandaNET CCCI (Kenya)

Performance Indicator & Stakeholder Count	KRA (or Link to KRA)	Monetization
Increased income from online employment & entrepreneurship (25 Out-of-school teen mothers in 3 years, 15 Usafi Boyz members per year)	Economic Position of Community Stakeholders	Net income from clerical/data annotation (KES 270,000/year) and online commerce (KES 660,000/year)
Improved access to digital educational resources (community schools & students – 10 educational materials made available per year)	Inclusive Human Development	Cost savings from lower-cost educational materials (USD $227/ year)
Improved capacity to deliver appropriate mental health information, education, and services online (4 mental health professionals per year; 50 youth & mental health professionals & patients per year participating in mental health fellowships)		From: 20 shillings/ hour to 6.25/ hour (unlimited)
		Savings of KES13.75/ hour x 260 times a year = savings per capita of KES 3,575.00 or USD $29.24
Increased number of children effectively immunized based on health standards and required protocols (40 community health promoters (CHPs) per year ECHIS and KHIS; 4 health professionals monitoring the health programs		Savings of KES 20 per access x 260 days = KES 5,200 or USD $42.53 a year
		Savings of KES 13.75/ hour x 260 times /year = KES 3,575 or USD $29.24

Performance Indicator & Stakeholder Count	KRA (or Link to KRA)	Monetization
Faster and more affordable way of reports and orders submission (4 health care providers per year)	Inclusive Human Development	Savings of KES 50 x 52 weeks = KES 2,600 or USD $21.27
Increased awareness and action on environmental issues (3,234 beneficiaries)	Environmental Awareness & Advocacy	Savings on entry fees for environmental facilities (Arboretum cost: USD $0.49/adult, USD $0.20/child)
CBOs that are engaged in the governance, management, and operation of the Tanda CN in Kibera (10 CBOs for 3 years)	Community Empowerment & Digital Governance	KES1,500 x 12 = KES 18,000 (net) or USD $147.24
increase in percentage of community representatives occupying management and governance positions (2 representatives per year for 3 years)		IKES 45,000 x 12 = KES 540,000 or USD $4,417.20
Improved enabling environment for Community Networks (CN governance positions & technicians)		Salaries & consulting fees for CN technicians and managers (KES 540,000/ year for governance, KES 432,000/year for technicians)
Number of CNs established and developed serving new unconnected and underserved communities (11 CNs per year for 3 years)		Cost of a network consultant is KES 975 per hour; assume 12 hours per CN per year (KES 975 x 12 = KES 11,700 or $95.70)
Increase in the number of women beneficiaries and organisations inquiring and reporting cases of online gender-based violence (2,200 for 2022-23 and 2023-24)	Empowered women as stakeholders in digital transformation	Savings on domestic abuse case services (e.g., hospitalization, counselling, legal, etc). KES 502 or USD $4.10
Number and percentage of women occupying governance, management, and technical positions in CNs (6 women per year for 3 years)		Savings from being scammed; KES 300 to 1500 shillings per potential victim of illegal job placement KES900 x 7 = KES6,300 ($51.53)
Increase in the number and capacity of CNs serving unconnected and underserved communities (4 Community representatives per year for 3 years)	Improved enabling environment for Community Networks	KES 475/hour x 4 hours/month x 12 = KES 22,800 (USD $186.50)

Table 2.19. Monetization of Impact – Zenzeleni CCCI (South Africa)

Performance Indicator & Stakeholder Count	KRA (or Link to KRA)	Monetization
Development of community-based institutions, groups, leaders and technicians with capability to govern and manage internet and digital resources (134 counts of CBIs, hubs, household hosts, tribal authorities, technicians)	Community Empowerment & Digital Governance	Net income from servicing CBIs; net income from 2 tower hosts; rental or hosting fees earned; Household hotspot– Earnings by households hosting Wi-Fi hotspots Monetized benefits: Capacitating tribal authorities for enabling buy in of community; Technicians' income gains
Increase/expansion in the establishment of CCCIs serving other rural communities (8 enterprises & 14 new client households)		Net income & savings gained of enterprises in 2 villages Mankosi & Zithulele; Expansion of client-households led to savings due to connectivity
Increase in the number of community members securing online jobs and entrepreneurship in the digital economy (433 persons for 3 years)	Economic Position of Community Stakeholders	Cost savings from job applications & business setup (without vs with CN scenario; US $23,794 for 3 years)
Improved access to government services (printing, laminating, applying for IDs, social grants); 1,134 persons for 3 years	Inclusive Human Development	Cost savings from accessing services locally instead of traveling (USD $16,626 for 3 years)
Increase of youth applying, enrolling, and graduating in various higher educational institutions (400 community members; 41 graduates for 3 years)		Cost savings without versus with scenario ($12,005 saved by community members – youth/students and $8.982 higher salary valuation for graduates)
Increased effectiveness and efficiency in accessing educational resources by students (1,020 students doing research; 166 persons availing of digital literacy programs for 3 years)		Students doing research: Cost savings of $41,126 for 3 years; and Attendees to digital literacy: cost savings of $16,774)
New women as leaders and technicians in CCCIs (8 women for the whole 3 years)	Women as stakeholders in digital transformation	Income gain, value of acquired skills and capacities ($10,690)

3 Breaking the Financial Divide of Digital Divide

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3.1 Introduction

Over the past decade locally developed community-led approaches to the provision of telecommunication infrastructure have emerged as a promising strategy to addressing the 'digital divide.' However it has recently become clear that these initiatives face considerable difficulties in finding additional financial resources to grow and replicate their networks, or to reach sustainability. In the search for options to improved funding, identifying mechanisms which promote more support from the financial sector requires further exploration[69]. One avenue for this exploration is to identify the financing needs of existing initiatives and consider to what extent these needs are similar to other industries in the social and solidarity economy which have successfully developed support strategies from the financial sector.

With commitments such as those expressed in the recently adopted UN Global Digital Compact[70] to "invest" in "local networks" to "close the digital divides", we believe that research in this area could significantly contribute to identifying solutions for a better funding environment for community centred connectivity initiatives. This report is based on a series of such research activities commissioned by the APC's LocNet programme and carried out by MCE Conseils, a Canadian financial advisor specializing in the social economy sector.

69 Connectivity Capital. *Financing Mechanisms for Locally Owned Internet Infrastructure*. Association for Progressive Communications, 2021. https://www.apc.org/sites/default/files/financing-mechanisms-for-locally-owned-internet-infrastructure.pdf.

70 United Nations. *Global Digital Compact*. United Nations, 2024. https://www.un.org/digital-emerging-technologies/global-digital-compact.

3.2 Methodology

The initial activities of this research included an extensive review of existing literature, covering both the strategic level of financial challenges as well as considering a number of case studies covering various specific connectivity initiatives. A series of interviews with operators and actors involved in financing or generally supporting this sector was also conducted, along with an analysis of challenges faced by connectivity initiatives in comparison with social impact organizations operating in other sectors. To better understand the financing needs of community connectivity initiatives, in April 2025 a survey of existing networks was carried out in English[71], Spanish[72] and Portuguese[73] using a variety of communication channels where promoters and implementers of community connectivity initiatives exchange information, including the IGF DC3 mailing list. Before sharing the survey it was tested with two initiatives from Colombia and Indonesia to further refine the questions and adapt them for the prospective audience.

The survey consisted of four sections of questions covering:

- Section 1: Basic information about the organization responding;
- Section 2: Financial information of their current initiatives;
- Section 3: Financial information of planned and future initiatives; and
- Section 4. General questions regarding other goals, challenges, technical support and usage of the infrastructure.

The questionnaire had branching sections and not all questions were compulsory, hence there was a divergence in the number of respondents per question.

Results were analyzed using basic statistical tools and quantitative analysis, which led to some strategic financial and operational conclusions. Where possible, the results were matched with the relevant literature from community-centred connectivity to validate the analysis.

71 https://mceconseils.limequery.com/811824?lang=en.

72 https://mceconseils.limequery.com/811824?lang=es.

73 https://mceconseils.limequery.com/242654?lang=pt-BR.

A general mapping of financial actors involved in the field of connectivity was also conducted covering refundable finance (venture capital and development banks, etc.) and non refundable funders (philanthropy and dedicated foundations), which was completed by a series of interviews.

Finally, and in order to frame the results in the context of the social and solidarity economy and social impact finance, the experience and literature accumulated by MCE Conseils over its 30 years of experience was considered in order to explore similarities and develop recommendations. This was supported by various past assignments and the involvement of MCE Conseils with social finance in general, local development international cooperation, social economy and financing advocacy bodies and the UN Inter-Agency Task Force for Social and Solidarity Economy[74].

3.3 Results

3.3.1 Community Connectivity Initiatives: operational profile, impact and challenges

Eighty-one community-centered connectivity initiatives (CCCIs) participated in the survey. Given the diverse landscape in this sector, this survey cannot be considered fully representative of the thousands of CCCIs active worldwide. However, it provides a solid foundation for developing a factual basis regarding their characteristics and the expression of their needs, which will inform proposals aimed at creating a more suitable and efficient financing ecosystem.

A large majority (87%) of CCCIs participating in the survey were found to be non-profit collectively owned entities, and a minority were privately owned social enterprises, with all except one having a formal social impact mission. Two thirds of the initiatives that were surveyed own and operate independent networks, and the remainder concentrate on helping communities access existing networks.

74 UN Inter-Agency Task Force for Social and Solidarity Economy https://unsse.org/.

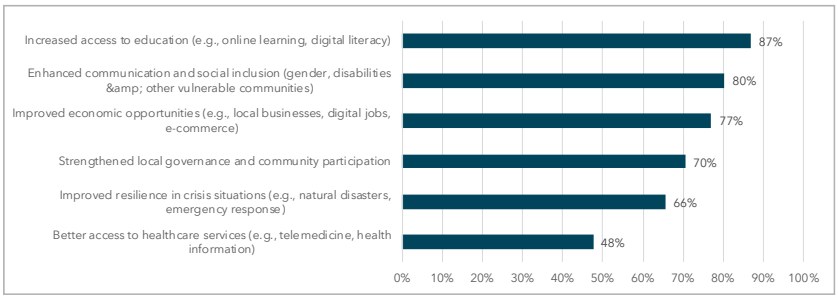
Table 3.1. Legal status of CCCIs responding to the survey

	Number	Distribution
Cooperative	1	1%
Non-profit organisation	55	68%
Other – Federations and networks	11	14%
Private enterprise	7	9%
Social enterprise	3	4%
	Number	**Distribution**
Operate an independent network	23	52%
Help communities use an existing network	15	34%
Hybrid strategy	6	14%

Regardless of the legal, governance and ownership model used, or type of services offered, all of the community-centred connectivity initiatives had the same goal: to strengthen and improve the well-being and self-determination of communities that are unserved or underserved. In this way, community-centred connectivity initiatives can be seen as responding to the needs and interests of the community, as defined by the community.

In this respect, the respondents identified the following benefits of their activities:

Figure 1. Main Benefits for the Community

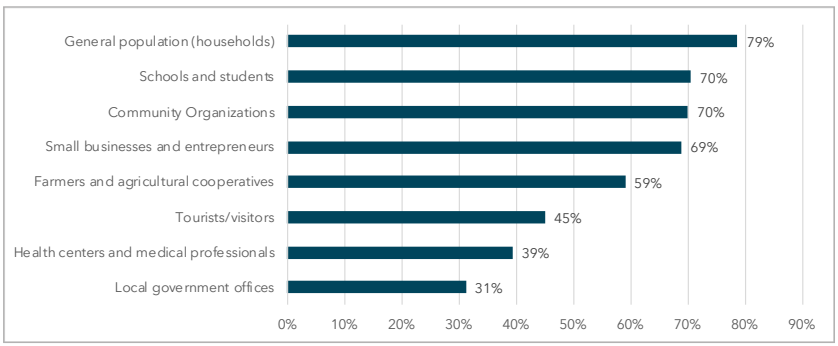


This finding aligns with case studies and the general literature on the sector, showing that the establishment of CCCIs has resulted in a number of social, economic and environmental gains for the communities covered[75]. In terms of social benefits, they are now digitally

75 N. Bidwell and M. Jensen and *Bottom-up Connectivity Strategies: Community-led Small-scale Telecommunication Infrastructure*. Johannesburg: APC, 2018. https://www.apc.org/en/pubs/bottom-connectivity-strategies-community-led-small-scale-telecommunication-infrastructure.

connected and no longer isolated from the outside world. Moreover, members are enabled to access government services that are otherwise difficult to avail or never availed of at all. In addition, being online has allowed them to create and access educational and learning tools, as well as materials promoting their culture and traditions, especially for Indigenous communities. At the same time, the online networks have led to better coordination and security, safer communities, and faster emergency response during calamities and disasters. As such, the community connectivity initiatives responding to the survey (see Figure 2) serve the general population, but also support specific groups within the community that demonstrate some of the economic and social positive impact of their activities mentioned above.

Figure 2. Main users of connectivity initiative



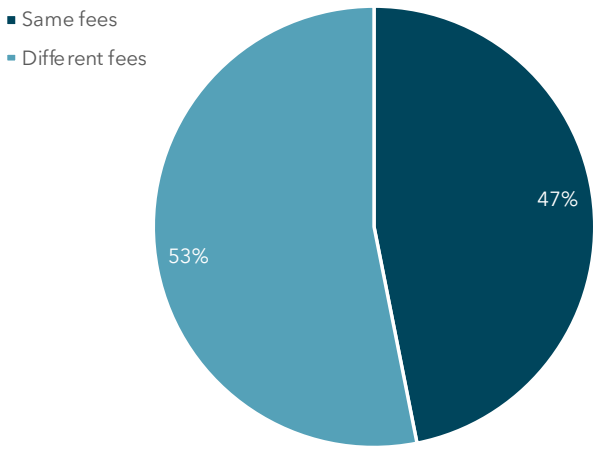
The social mission of the initiatives does not prevent them from aiming to also have a positive economic impact, through, for example, the provision of market information, improved marketing of SME products and services, job creation, and general access to management information for local entrepreneurs, as well as market opportunities. In terms of economic benefits, online content developed by the local population has also increased tourism in several communities. In addition, entrepreneurial non-profits in Southeast Asia have used CCCIs to improve the efficiency, market reach, productivity and incomes of the enterprises they implement and/or support[76]. Others have found new income sources by marketing their products

76 Toquero, Armen Ria, Gomer Padong, Cindy Falcutila, and Carlos Rey-Moreno. *Understanding Community-Centered Connectivity Initiatives in Asia and the Pacific*. April 2025. Association for Progressive Communications. https://www.apc.org/en/pubs/understanding-community-centred-connectivity-initiatives-asia-and-pacific.

online, engaging in public Wi-Fi access rental and print services, selling internet vouchers, and implementing sustainable agriculture practices learned online. Several of the survey respondents also note income-generating opportunities seized by users on their own initiative, due to the accessibility of the network.

In many situations, CCCIs have opted for a socially-driven differential pricing policy, where business customers are charged a higher fee in order to subsidize the price offered to the public. Similarly, some networks provide free access in the off-peak (evening) periods while generating revenue from businesses during the day.

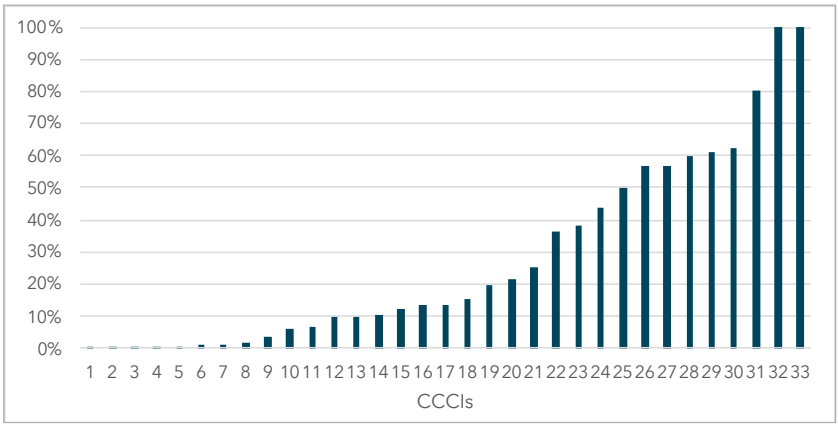
Figure 3. Differential Fee Structure[77]



Most initiatives are currently operating in small, remote markets. And in these markets, their rates of penetration vary greatly. Among 33 of CCCIs surveyed, two declared controlling 100% of their market. About 25% of respondents are above 50% of market share, while half of respondents are below 20% share of the market – these are mostly urban networks competing against major private actors where expensive services were present before the CCCIs started to operate, but with an economic barrier resulting from unaffordable monthly fees.

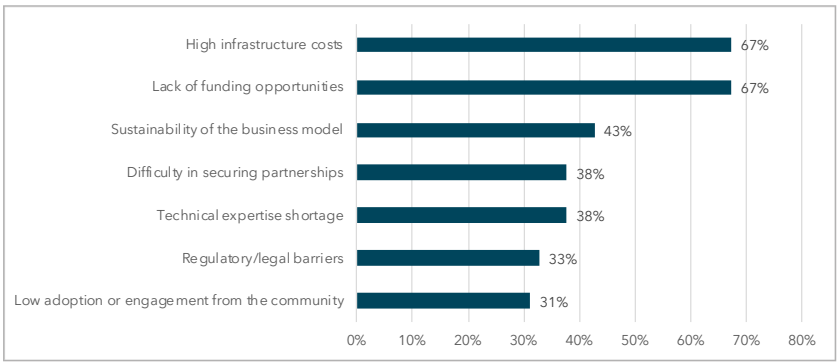
77 Does the public get charged the same fee as private companies, tourists or local NGOs/ government offices: (N = 32).

Figure 4. Penetration of market (customer / Population)



When asked what have been or will be the biggest challenges in implementing their CCC initiatives, high cost of infrastructure, access to funding opportunities, and the limited economic sustainability of the business models came out as the major challenges. Finding a winning formula which addresses the financial burden arising from the relatively high capital costs of the industry while carrying out a mission of economic accessibility (reduced pricing strategy) remains the major challenge for the respondents. Finding an equilibrium between their social missions and financial sustainability, and between low capital availability and access to financial products with a low cost is central to CCCIs path to growth for their mission to have an extensive impact on the digital divide.

Figure 5. Community-centred connectivity initiatives' biggest challenge



Almost all respondent CCCIs expressed some need for external support for fundraising, as well as a diversification of their financial partners. In addition, in many cases, they also recognize the need for technical support, and training on management, business models, marketing and financial management.

Table 3.2. The need for external support[78]

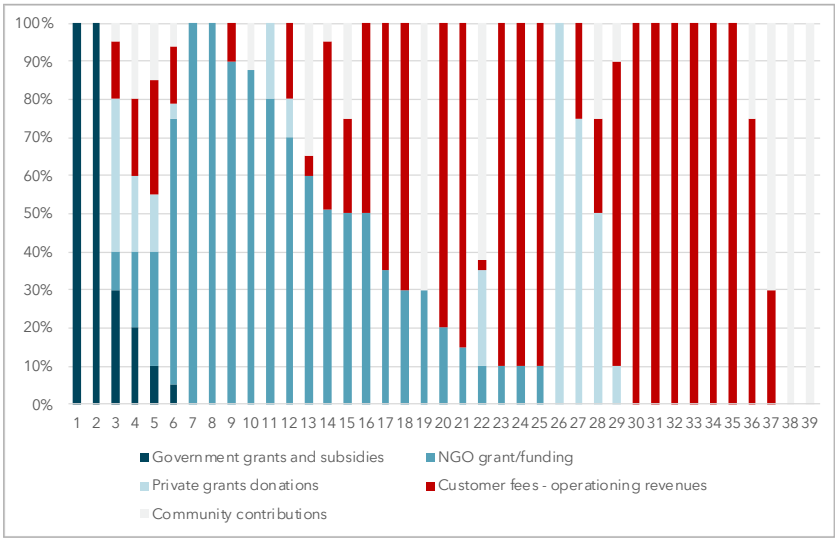
	Average	% over 6/10
Fundraising for expansion	9,02	92%
Our organization needs to develop additional engagement with external financial partners to complement our existing financial network	8,18	82%
Production of local content	8,06	81%
Communication and marketing support	7,46	72%
Counsel with regulatory authorities	7,4	62%
Financial management and negotiating support	7,24	70%
Business model / sustainability plan development	7,13	70%
Technical support for operation and equipment maintenance	6,87	65%
Community mobilisation efforts	6,52	50%
Management support (operations and human resources)	6,24	52%

3.3.2 Financial strategy and sustainability of community-centred connectivity initiatives

The survey also clearly demonstrates that CCCIs can overcome their internal economic challenges through a series of different strategies where revenues from customers represent a fraction of the total income. The chart in Figure 6 presents the revenue source diversity of some 40 CCCIs, ranging from customer fees, public or private grants and community contributions. The data indicates that only 25% of the respondents concentrate on only one source of funding for their operations.

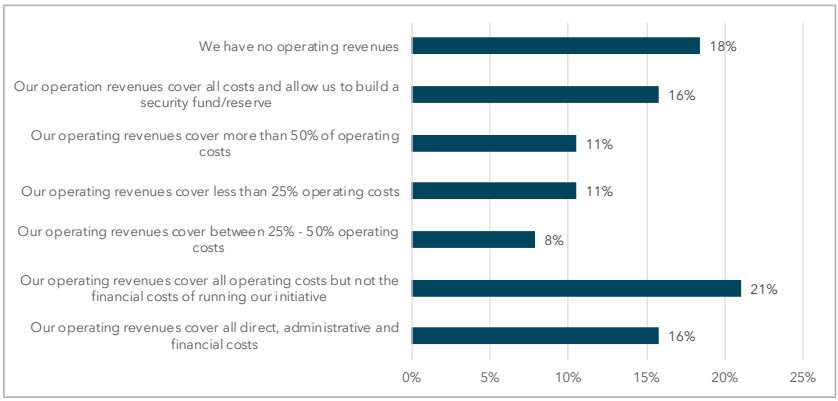
78 Question: On a scale from 1 to 10 (1 = Totally Disagree, 10 = Totally Agree), to what extent does your initiative need external support for: (N = 50).

Figure 6. Community-centred connectivity initiatives' income distribution



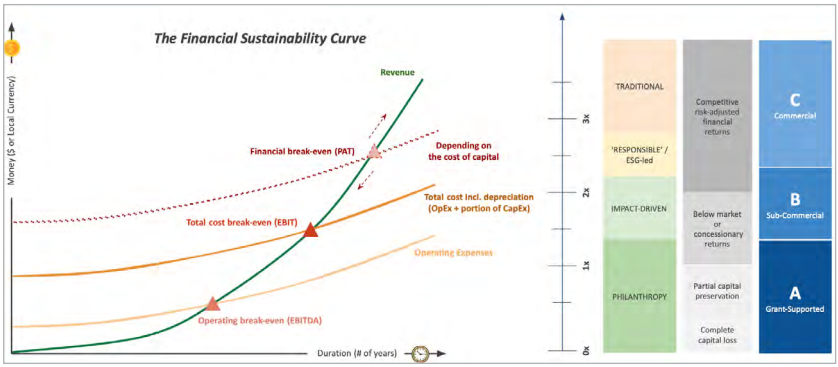
Overall, only 16% of respondents had operating revenues (customer fees) which covered all of the costs for the organization. Government grants, private grants from foundations and community contributions represent an important source of income for the many CCCIs that have succeeded in demonstrating to partners that their positive impact can be translated into complementary revenues, as for now their long term sustainability depends on those financial partners to cover their operating expenditure.

Figure 7. Financial autonomy of operations



Obviously, the financial position, needs and potential solutions for CCCIs evolve with the level of development of each organisation[79]. As can be seen in the survey's results, the initial phases of CCCI development are mostly financed by grants and philanthropy. This situation usually takes place when start-ups are not yet able to demonstrate market demand, and their lack of ability to raise equity finance prevents them from raising commercial financing. Progressively, when revenues increase, CCCIs will aim for the project to reach operating break-even (covering operational costs), and then global break-even (covering all operation, management and financial costs), to eventually reach a financial breakeven, allowing remuneration of equity or equity-like form of debt. It is with each of these stages that CCCIs can attract diversified and partly private funding.

Figure 8. Sources of capital: The types of funding available changes as CCCIs navigate along the Financial Sustainability Curve



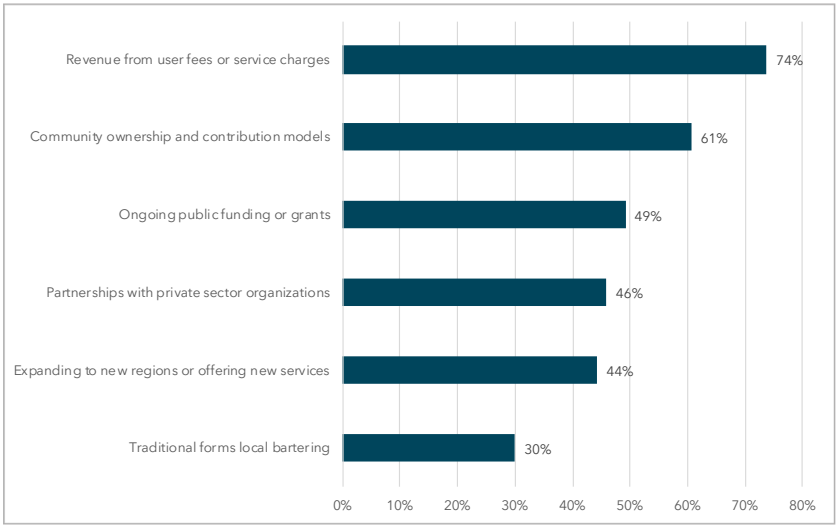
The results of the survey clearly show that many CCCIs are not at the point yet where they can obtain commercial investment. About 45% of the respondents had 50% or lower level of costs covered by revenue, while 37% were over the operational break even point.

Of note in this respect is that when looking to the future, many CCCIs believe that their long-term sustainability will not just come

79 Connectivity Capital. *Financing Mechanisms for Locally Owned Internet Infrastructure.* Association for Progressive Communications, 2021. https://www.apc.org/sites/default/files/financing-mechanisms-for-locally-owned-internet-infrastructure.pdf.

from user fees, and expect that a mixture of different solutions and sources of income will be necessary to ensure sustainability. About 25% of respondents did not even include user fees as part of their revenues, and do not consider them the only way of financing their services, as they consider that their mission is ensuring physical and economic accessibility for diverse populations including groups confronting socio-economic constraints.

Figure 9. The means toward achieving longer term sustainability



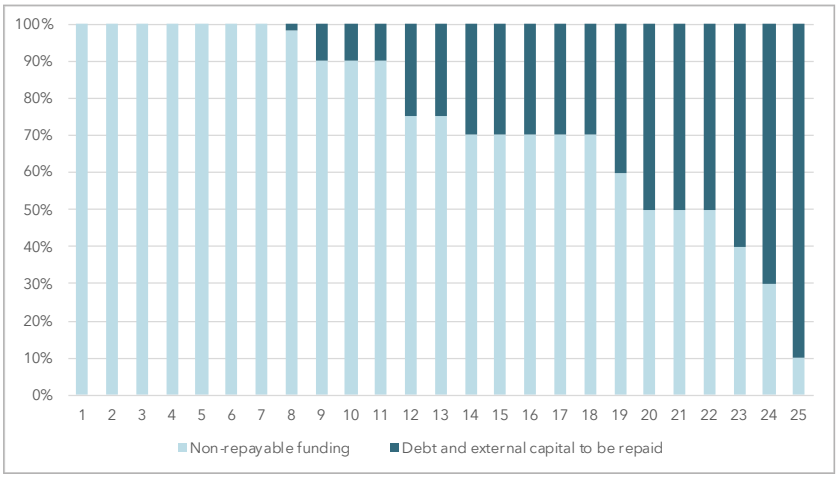
Considering funding source diversification, Table 3 shows that the 36 CCCIs responding to this question show an average of 2.2 different sources of funding among the financing strategies of their initiative, all of them relying on non repayable funds to address their financial needs. On the other hand, none received a traditional bank loan, even for a small part of their assets, which is a clear demonstration of the financing fracture behind the digital divide. And this is in spite of the fact that according to the respondents, on average, 47% of project costs are dedicated to fixed assets, which could offer at least some kind of asset guarantee.

Table 3.3. Financial Structure of community-centred connectivity initiatives

Financial structure						
Non repayable financing						
Internal capital (coming from surplus and members investment	Donations from community & diaspora	Municipal and other government grants	Grants and subsidies from local foundations/ charities/ corporate	International cooperation grants	Other non repayable	TOTAL
9	8	4	7	22	7	36
25%	22%	11%	19%	61%	19%	
Repayable financing						
Local banking system – classic loan and debt	Venture capital (personal loans, private financing with interest	Equipment supplier financing mechanism (loan)	Government financing (with or without concessional terms)	International development finance	Other debt	TOTAL
0	6	4	4	3	6	23
0%	17%	11%	11%	8%	17%	

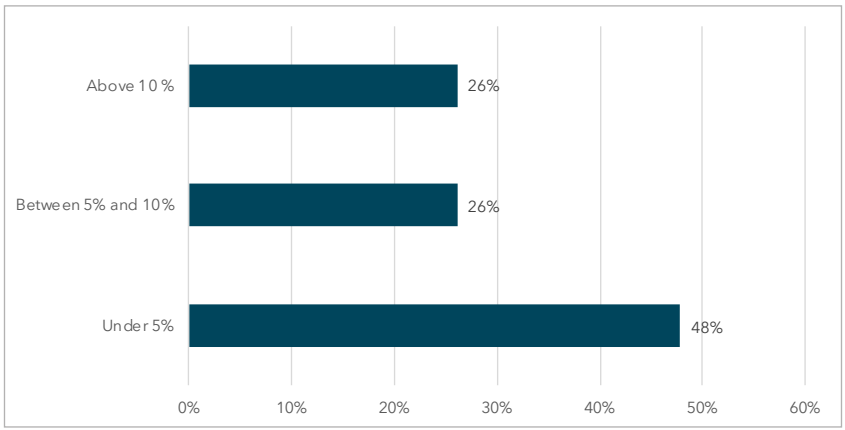
Similarly among 25 CCCIs, a minority believe they are able to finance a substantial part of their future projects with refundable sources. Only 25% of them think that 50% of their capital needs could be financed with such products.

Figure 10. Future project financing strategy of 25 community-centred connectivity initiatives



As shown in the chart below, when the details of financial products are considered, CCCIs expect interest rates that are clearly under the levels of commercial interest rates and term lengths currently available on the market.

Figure 11. Adequate interest rate



All these results indicate that access to funding and support mechanisms still represents a real challenge for community connectivity initiatives. In this respect they need to stay focused on their social and environmental mission while maintaining a stable economic model that protects them from external competitive pressures and market fluctuations.

3.3.3 Lessons from the Social and Solidarity Economy finance

Unpacking social and solidarity economy entities

With the results presented in the previous two sections, it is clear that CCCIs are primarily nonprofit organizations operating a business activity which aims to have a positive social impact. They are mostly collectively owned, and have a democratic governance structure representing members of the community they serve, where the goal is financial sustainability, not profit maximizing. As such, they share many similarities with Social and Solidarity economy enterprises.

SSE entities seek to achieve both social and financial benefits from their services. Unlike traditional businesses that seek profit primarily

to enrich the investors, SSE entities contribute to resolving social and environmental problems while also distributing the wealth created to a broad local constituency, especially those from the poor and disadvantaged communities and sectors.

In general SSE entities face many of the same constraints as community-centred connectivity initiatives. Aiming at common good through collective ownership with democratic governance, SSE initiatives face economies of scale limits (as they tend to remain small and local), low internal capital availability and limitations on financial strategy building, given the challenges for non-profits to attract equity. In this context, many experiences among SSEs have demonstrated the need for dedicated structures or departments among their funders and their partners in order to support SSEs effectively, and to guarantee the needed level of financial resources, along with the availability of people specialized in developing their potential, and in addressing process friction and other challenges.

Experience in this area indicates that different forms of ownership and governance aimed at social impact, requires strategies to be adapted to their management culture and financial constraints in order to be effective and efficient. Among other needs, SSE financial support programs cannot duplicate the traditional expectation of capitalization of projects by large investors expecting a market related return. SSE enterprises use a hybrid strategy of community, public and private funding which calls for specialized analysis combined with expertise with the workings of SSE or non-profit entities.

In this respect SSE funding needs to be approached as a demand and supply ecosystem with a strengthening process in which technical support structures can describe SSE business plans in ways that are adapted to the financial sector's expectations. On the supply side, as discussed below, there are needs to develop financial product diversity that offers complementary solutions. Most experiences show that various financial actors working together on a single project to share financing, analysis, risk and returns is more effective.

Funding for SSEs can be provided through several channels. At the national level, there are traditional financial players, the same ones that finance more commercially oriented small and medium-sized

enterprises (SMEs), as well as institutions that are specialized in financing SSEs. Among financial institutions that fund SSEs, the most well-known are cooperative banks, microfinance institutions, impact investors, community development financial institutions (CDFIs) and various government programs focussing on SMEs. Most of these offer financing programs tailored to SSEs, such as grants, second rank or subordinated loans[80] and tax incentives.

In countries where the SSE sector is most well developed, actors have built a network of institutions and financing mechanisms that have enabled the growth of the social economy to reach 10% of national GDP[81]. This development has been made possible by virtue of a constant (although not without difficulty) dialogue between civil society, unions, local organizations, the private sector and the State. This dialogue has enabled the emergence of complementary initiatives and innovations contributing to the construction of an ecosystem of technical support and financial products adapted to the needs and challenges of organizations in the social and solidarity economy.

On the supply side, the different types of investors are often able to act in a complementary manner, depending on their openness to risk, their return requirements, the size of operations, and the stage of life of the companies. This diversification makes it possible to meet distinct needs, such as capital expenditures and working capital. A culture of group intervention also facilitates the arrangement of more complex projects. Thus, private, civil society and state may share financing, risks, guarantees, analysis, monitoring, and support costs, to exchange opportunities as well as returns in the form of a variety of interest rates which are specific to the particular organisation being financed. Having a multiplicity of financing actors also spreads

80 These loans are behind the first lender if they have to recover their loan through selling assets or capturing the borrower equity.

81 According to the Spanish Ministry of Labour and Social Economy, the social economy in Spain comprises over 43,000 enterprises and organisations, employing more than 2 million people, and contributes around 10% to the country's GDP. Confederación Empresarial Española de la Economía Social (CEPES). *The Most Relevant Companies in the Social Economy 2022–2023*. Madrid: CEPES, 2023. Accessed May 31, 2025. https://www.mites.gob.es/EconomiaSocial/en/sobre-economia-social/es-espana/index.html.The European Commission reports that, as of 2021, the social economy in France accounts for 14% of private employment, involving 2.3 million people and 12 million volunteers, and contributes approximately 10% to the national GDP. European Commission. "France." *Social Economy Gateway*. Accessed May 31, 2025. https://social-economy-gateway.ec.europa.eu/my-country/france_en.

risk and lowers administrative costs by sharing analysis, which may increase capital available to SSE entities such as CCCIs.

Multilateral development support for the Social and Solidarity Economy

In 2023, the United Nations General Assembly adopted resolution A/RES/77/281 which recognized the importance of promoting SSEs for achieving the Sustainable Development Goals (SDGs), and encouraged Member States, relevant entities of the United Nations development system, multilateral financial institutions, international and regional financial institutions and development banks to give due consideration, promote and implement national, local and regional strategies, policies and programs aimed at supporting and strengthening the SSE as a model for sustainable economic and social development, taking into account the circumstances, plans and priorities of each country[82].

More precisely, the fourth mandate of the resolution aims at "Encourage(ing) multilateral, international and regional financial institutions and development banks to support the social and solidarity economy, including through existing and new financial instruments and mechanisms adapted to all stages of development;".

This resolution was followed by a UN General Secretary General Report on "Promoting the social and solidarity economy for sustainable development"[83], where it stated that SSE entities play a pivotal role in fostering technological advancement and sustainable development, addressing SDG 9 (Industry, Innovation, and Infrastructure) and SDG 11 (Sustainable Cities and Communities) across regions. SSE entities often engage in innovative practices that drive technological solutions tailored to local needs, promoting inclusive and sustainable industrialization. They support small-scale industries and sustainable infrastructure projects that enhance resilience and liveability. These efforts help bridge the digital divide, and improve the quality of life, preserve viable economic activity, and contribute to the creation of more equitable and sustainable environments.

82 Draft concept note for the 4th International Conference on Financing for Development – Strengthening the financing of the social and solidarity economy to address the challenges of international development finance.

83 United Nations. *Promoting the Social and Solidarity Economy for Sustainable Development*. New York: United Nations, 2023. https://digitallibrary.un.org/record/4063386.

In order to operationalized the United Nations report, the UN Inter-Agency Taskforce on the Social Solidarity Economy (UNTFSSE) has launched a technical working group on Financial Access and Support (TWGF)[84] for SSE entities. The objective of the working group is to identify, share good practices and lessons learned to engage relevant stakeholders and encourage them to promote SSE access to finance and support through existing and new technical and financial instruments, and mechanisms, adapted to all stages of development and political and economic contexts in the context of financing for development[85]. Appendix A contains a series of recommendations from the TWGF providing insights into how this growing recognition can translate into tangible benefits for SSE financing.

Finance trends/typologies which present opportunities for SSE financing

The landscape of SSE financing is experiencing significant evolution through various financial mechanisms and approaches. As such, impact investing has emerged as a growing trend, characterized by its dual objective of generating measurable social and environmental impact alongside financial returns. A total of $1.571 trillion USD in impact investing assets is now under management worldwide, representing a 21% compound annual growth (CAGR) of the total impact investing market since 2019.[86]

This approach particularly resonates with many SSE entities' core mission of prioritizing social and environmental objectives while maintaining financial sustainability. However, as evidenced in current market dynamics, impact investing faces several significant challenges. These include industry-led definitions and the associated risk of 'impact washing', where organizations might brand themselves with an appearance of impact intentionality, but without substantial commitment. It is also important that SSEs should be able to independently decide on their impact metrics and methods, instead of responding to the industry's strategy, tools and objectives.

84 https://unsse.org/2024/09/10/launch-of-the-untfsse-technical-working-group-on-financial-access-and-support-for-sse-entities/.

85 Please consider visiting: https://knowledgehub.unsse.org/ for more info.

86 https://thegiin.org/publication/research/sizing-the-impact-investing-market-2024/.

The ecosystem faces additional structural challenges that affect its development and effectiveness. From an investor perspective, while there appears to be some variety in financial instruments (e.g equity, debt, guarantees, blended finance), the demand side reveals a much less developed ecosystem. Additionally, there is a risk of creating a separate ecosystem where impact finance primarily supports "favored" SSE initiatives which are more attractive to a finance-led ecosystem, potentially overlooking other valuable SSE entities that are less profitable. Furthermore, there is often a cultural and knowledge gap between the impact investing ecosystem (supply side), that often focuses on the traditional startup model instead of the SSE ecosystem which expects less return and lower scale of acceleration. To overcome this gap, dialogue and acculturation between these two ecosystems and sharing similar objectives is needed.

The broader sustainable finance ecosystem, encompassing ESG investing, social finance, and solidarity finance, presents both opportunities and challenges for SSE financing.

Table 3.4 The spectrum of social and financial investing[87]

Sector	Philanthropy		Social Impact Investing		Sustainable and Responsible Investing*	Conventional financial investing
Type of actor	Traditional Philanthropy	Venture Philanthropy	Social Investing	Impact Investment	ESG investing	Fully commercial investment
Focus	Address societal challenges through the provision of grants	Address societal challenges with venture investment approaches	Investment with a **focus** on social and/or environmental outcome and some expected financial return	Investment with an **intent** to have a measurable environmental and/or social return	Enhance long-term value by using ESG factors to mitigate risks and identify growth opportunities	Limited or no regard for environmental social or governance practices
Use of ESG metrics and methodologies						
Return Expectation	Social return only	Social return focused	Social return and sub-market financial return	Social return and adequate financial market rate	Financial market returns focused on long-term value	Financial market returns only
	Social Impact	⟷	Social and financial		⟷	Financial returns

87 Stylized adaptation from OECD (2019) Social impact Investment, the impact imperative for sustainable development.

While recent years have seen unprecedented SSE development and favorable legislation[88], the sector faces significant obstacles. These include deal flow issues stemming from the multiplication of small, isolated but worthwhile initiatives, insufficient links between supply and demand sides, and inadequate support measures.

The market also struggles with multifaceted risk factors, particularly in emerging markets, where political instability and lack of infrastructure create additional barriers. Furthermore, the size of the market for SEE entities remains unclear and difficult to measure, with very few impact finance vehicles available in certain regions, and the small scale of many SSE initiatives and specialized intermediaries posing additional challenges.

The evolution of blended finance approaches, combining public and private capital, also offers promising opportunities for the development of SSE entities, including CCCIs, particularly in challenging contexts. However, successful implementation requires addressing several key issues: the need for extensive non-financial support (including advisory services, capacity building, and technical assistance), the crucial role of intermediaries in providing financial literacy and local-level services, and the importance of ecosystem capabilities in absorbing both financial and non-financial resources.

Additionally, there is a significant mismatch between donors' awareness of the needs of SSE initiatives' needs, such as CCCIs, and the available financing mechanisms that could favour a leverage impact increasing the number and size of initiatives supported by grants, but not exclusively by such non-refundable funds. The development of digital payment systems, crowdfunding, matching funding and fintech solutions presents opportunities which require careful oversight to avoid adverse effects on financial inclusion, particularly in regions with limited supervisory capabilities[89].

88 Such as the European Union's (EU) taxonomy for sustainable activities, defining criteria for economic activities that are aligned with a net zero trajectory by 2050 and the broader environmental goal shttps://finance.ec.europa.eu/sustainable-finance/tools-and-standards/eu-taxonomy-sustainable-activities_en, the EU's Corporate Sustainability Reporting Directive,https://finance.ec.europa.eu/capital-markets-union-and-financial-markets/company-reporting-and-auditing/company-reporting/corporate-sustainability-reporting_en, China's "Corporate Sustainability Disclosure Standards (CSDS) – Basic Standards (Trial).", https://www.pwccn.com/en/audit-assurance/ministry-of-finance-issued-sustainability-disclosure-standard-exposure-draft-jun2024.pdf and Botswana's "Sustainability Disclosure Guidance" https://www.corporatedisclosures.org/content/news/botswana-stock-exchange-publishes-sustainability-disclosure-guidance.html.

89 UNTFSSE Report on financing social and solidarity economy, mentioned above.

3.3.4 Analysis of the supply-side of financial solutions for community-centred connectivity initiatives

The digital divide is a solvable problem. The technology exists. What is primarily missing are the right financial structures to get investment to where it is needed most.

It is not as if there is a complete desert of financial solutions in this sector. According to the analysis conducted as part of this research[90], many actors are involved, and innovative solutions are put forward. The following table illustrates the diversity of financial institutions involved in the field. They collectively represent more than 15 billion $ of asset value. Of course, a few of those actors are continental development banks and other large institutions that show a large balance sheet, but only a marginal part of it is dedicated to the digital divide. We can also observe the creation of new tools and initiatives – 63% of the financial institutions identified were created after 2000 and 44% even after 2010.

Table 3.5 Basic description of 54 financial actors involved in financing CCCIs

Indicator	Specification	Total	Loan inst	Grant inst	Public	Private profit	Private nonprofit
Interview category	Learn how	28	7	4	3	5	11
	Potential fund contributor	54	16	8	8	11	13
	Close partners	2	2	0	0	1	1
Region of activity	Global	40	11	5	5	11	13
If global not mentionned	Asia	11	3	1	1	2	3
	Africa	18	4	5	3	3	7
	Latin America & the Caribbean (LAC)	3	1	1	0	1	1
	North America	3	1		0	1	0
	Europe	4	1	1	2	0	0
Asset Value	less than 50M$	9	4	2	2	4	3
	from 50M-1G$	10	4	4	6	4	0
	more than 1G$	13	6	4	2	7	4
	Global asset value estimate (Billion USD)	555,35	352,14	73,74	6,98 $	475,39 $	72,99 $
Year of Foundation	Before 2000	16	4	6	4	3	7
	From 2000-2010	10	6	2	0	6	4
	After 2010	24	11	6	6	8	11
Type	Public (government programs or initiatives)	11	3	7	11	0	0
	Private	42	18	7	0	18	24
	Total	53	21	14	11	18	24
	Profit	18	13	0	0	18	0
	Non-profit	35	8	14	11	0	24
	Total	53	21	14	11	18	24
Area of expertise	Specialized in connectivity	16	6	5	5	5	6
	General	35	15	9	5	12	18
Mission focus (can have more than 1)	Infrastructure and Digital connectivity	18	7	5	5	7	6
	Inclusive finance & development of financial markets	9	6	1	1	5	3
	Economic growth and private sector support	17	11	5	5	7	5
	Environment & climate action	10	4	2	3	4	3
	Local Development & Community Resilience	14	4	6	3	3	8
	Education, Innovation & Research	4	0	2	1	0	3
	Equity, Gender & Social Inclusion	8	5	3	0	0	8
	Governance Support & International Cooperation	4	0	2	1	0	3
	Total	84	37	26	19	26	39

90 Network identification by APC, institutional documentation review by MCE Conseils.

Among the initiatives surveyed, there is a mixture of private and public institutions, as well as a majority of financial instruments (supplying grants or loans) that are non-profit. Twenty-one of the 54 identified institutions are dedicated exclusively to connectivity. Other activities covered by them include.

- Economic growth and private sector support;
- Environment & climate action;
- Local Development & Community Resilience;
- Education, Innovation & Research;
- Equity, Gender & Social Inclusion;
- Governance Support & International Cooperation;
- Inclusive finance & development of financial markets.

This range of stakeholders and products are required to meet the needs of organizations that tend to combine social and economic objectives, with financial profitability perceived as insufficient to present acceptable return for traditional lenders. This multiplicity of offerings could make it possible to overcome the complexity of certain projects and put forward creative solutions to address CCCIs' financing limitations. It is often a matter of seeking diversity and complementarity in financing. But this complementarity or group culture, as defined in the previous section, is missing when looking at finance for community-centred connectivity initiatives.

This complementarity could encompass all kinds of financial products, ranging from total liability (debt) to equity. Depending on the financial product offered, the funding institution would assess the collateral guarantees (for traditional loans), financial profitability (for flexible or unsecured repayable financing, such as revenue based/performance based financing), or the social performance (for donations and grants). Different types of financing could then be combined to create a balanced financing architecture. For example, a grant could reduce the interest costs of repayable financing, thereby facilitating its accessibility. First loss cover from an external institution could be used to reduce the risk, and consequently the expected rate of interest. Social finance could offer guarantee-free (or subordinated) loans that multiply the impact of a single grant

operation, while both institutions could share analysis and monitoring costs. The complementarity of financing mechanisms promotes their synergy and effectiveness in supporting the development of organizations and their economic and environmental performance. It is also a matter of maximizing the impact of public investments by seeking the greatest leverage.

As discussed in the previous sections, community connectivity initiatives are finding that raising the needed startup funds from commercial or other traditional lenders is difficult, if not impossible. Operational barriers manifest in various forms: from traditional financing requirements that may be ill-suited for SSE entities, such as debt coverage by assets or administrative cost in proportion of financial return, to expectations regarding deal sizes that don't align with the realities of CCCIs. The evaluation criteria employed by financial institutions often fail to account for the specific characteristics and needs of the SSE, creating additional hurdles in the financing process. In this case, even soft loans from development funds are still currently more focused on large-scale national initiatives, and as conservative lenders or grant makers, they need to be convinced of the potential for novel strategies and the innovative business models of community connectivity initiatives.

With the financial profile showcased in earlier sections, CCCIs will need to engage with social investment networks. These institutions are a mixture of socially minded financial institutions grouped in Europe, for example, in the European Federation of Ethical (FEBEA) and in alternative banks, or, more broadly, in the Global Alliance for Banking on Values (GABV). These institutions share many operational frameworks of the impact investment sector, but have a more dedicated focus on social impact and accept sub-market financial or concessionary returns and conditions[91]. They are often nonprofit or cooperative banks, but also include social enterprises, constituted as private companies, but with a clear social mission. Although these institutions are relatively small compared with Impact investment, they may be a starting point to broaden the dialogue.

91 Although there are no examples existing yet for connectivity, the RISQ in Quebec finances SSE with no guarantee loans of 5 years at rates of 8%, which is normally an asset guaranteed market rate. It financed 350 SSEE and currently manages a portfolio of 20 M $. See https://www.risq.quebec/ for more details.

An additional advantage provided by impact actors is that they can disburse and manage funds in amounts that can be more effectively absorbed by community-centred connectivity providers, something that is much more difficult for large investors, which are designed to manage multi-million dollar disbursements. It is important to note that specialized intermediaries are already pervasive in many other sectors of development finance and financial assistance, and there is now an opportunity to incentivize them to add digital inclusion to their portfolio (please see Appendix B for an example) with support from public finance. This has special potential in the case of performance/revenue based loans considering that realtime data on performance data can be made available directly to the lender.

In relation to public finance, while this report has focused on private impact investment, research indicates a significant positive impact on GDP growth in regions where connectivity is developed, making it a clear argument for more public investment and development finance with a potential for fiscal return. National governments can in turn support these funds via tax incentives as well or other government mechanisms in addition to using tools such as guarantee pools, first loss investments, and other credit guarantees. This will allow new social investors to expand the range of their integrated capital mechanisms to be more effectively applied here. This goes beyond the current advocacy efforts for governments to fund CCCIs via Universal Service Funds, as well as their needed support to ensure that there is a conducive telecommunications policy and regulatory environment for these CCCIs, as well as the presence of financial and capacity-building resources to help establish and sustain the operator providing the connectivity, toward a long-term economic autonomy.

The potential role of philanthropy in unlocking supporting funds should also not be underestimated. Although it has been observed that their role in the digital sector is currently relatively small,[92] with, for example, only 0.05% of U.S Philanthropy going to digital equity related projects[93], some charities are starting to take much-welcomed

92 https://forum.effectivealtruism.org/posts/H6GhXkbfAy949xhGf/open-philanthropy-shallow-investigation%20telecommunications.

93 https://connecthumanity.fund/research-philanthropic-giving-to-digital-equity/.

action[94], and could play a more central role in addressing digital exclusion. While philanthropic dollars have traditionally been used to support digital skills, they can be used as catalytic investments to blended finance, or to social impact funds, to support investments in community centered connectivity initiatives.

3.3.5 Recommendations for CCCIs engaging impact Investment

Impact investment is a major trend gaining importance in the financial industry. While this trend is not yet playing a role in supporting CCCIs, impact investment in this sector has significant potential, especially given the role of digital infrastructure in enabling economic development, social progress, and environmental sustainability. The telecommunications/broadband sector is foundational in connecting people, businesses, and governments, and as such, it presents numerous opportunities for impact investors to drive both financial returns and positive social or environmental outcomes.

In engaging with impact investors, the following potential positive arguments could and should be included in business plans in order to attract financial partners:

- Social Impact: Many developing regions still face persistent digital divides. Impact investors can direct funds towards CCCIs as they work on expanding telecommunications infrastructure, particularly in underserved or rural areas which cannot be served profitably by traditional commercial network operators.
- Opportunities: Investment in low-cost internet access can provide essential services to underserved communities, improving education, healthcare, and financial inclusion. This type of investment has strong potential for both social impact and financial returns, as it opens new markets.
- Environmental Impact: The telecommunications sector is also critical in supporting sustainability efforts. For example, CCCIs can be leveraged to improve access to renewable energy, climate change mitigation solutions, and sustainable agriculture practices.

94 Notably the Internet Society Foundation, 48% Foundation, APNIC Foundation and the Association for Progressive Communications.

- Promoting financial Inclusion: Impact investors can support CCCIs that offer financial inclusion services, potentially helping millions of people who are unbanked or underbanked to gain access to financial services.
- Enhancing Education and Health: Telecommunications is critical in education and healthcare. E-learning platforms, telemedicine, and remote consultation services are increasingly important in ensuring equitable access to education and healthcare services.
- Catalyzing Innovation and Economic Growth: Telecommunications is a key enabler of innovation and economic development. Reliable connectivity supports entrepreneurship, business innovation, and the growth of digital economies, particularly in emerging markets.
- Support for Social Enterprises and SMEs: Many social enterprises in emerging markets rely on connectivity for their business models. Impact investments can support these enterprises, ensuring they can reach their target audiences and scale their impact.
- Telecoms in Crisis and Disaster Management: In times of natural disasters or humanitarian crises, telecommunications plays a critical role in coordinating relief efforts, providing emergency communication channels, and offering vital information to affected populations.

When looking at CCCIs, impact investors are likely to keep in mind the following key considerations:

- Financial Returns vs. Impact Goals: Investors need to consider balancing financial returns with the depth of social and environmental impact. Some projects may have lower financial returns but significant long-term social value, while others may be highly profitable and still produce social benefits.
- Scalability and Sustainability: To maximize both financial and impact returns, projects should be scalable and sustainable. Investors need to evaluate whether the initiatives can expand and thrive over the long term. This may not seem aligned with the goals of individual CCCIs, but a national federation of CCCIs could be a better suited vehicle to demonstrate potential scalability and larger size investment projects. Mutualization of financing among CCCIs could reap large advantages if the risk sharing can be solved by a collective monitoring structure.

3.4 Conclusion

This research has presented new results about the financial performance and financial needs of community-centred connectivity initiatives. In spite of their documented social impact, CCCIs face major challenges in implementing their initiatives, because of the capital intensive nature of connectivity infrastructure provision, limited access to funding opportunities and the economic sustainability of the business models based on maximizing economic access for users instead of the profits for investors.

The CCCIs surveyed also expressed the need for external support for fundraising, as well as a diversification of their financial partners. But in many cases, they also recognize the need for technical support, and training in management, business models, marketing and financial management.

The winning formula for solving the financial divide arising between high capitalization needs and a mission of economic accessibility (reduced pricing strategy) remains the major challenge for the respondents of the survey. Finding both equilibrium between social mission and financial sustainability, and between low capital and access to financial products with a low cost is central to CCCIs' path to growth for their mission impact.

This analysis has allowed us to make a clear case to define CCCIs as Social and Solidarity Economy entities. The positive impact of SSEs has been widely recognized, including by United Nations resolutions and reports by the UN Secretary General. The special elements that need to be considered for their finance and support have led to the creation of a technical working group on Financial Access and Support (TWGF) as part of the United Nations Inter-Agency Taskforce on the Social Solidarity Economy (UNTFSSE).

In the case of CCCIs, after analysing their potential supply-side, the lack of a "group culture" supporting SSE entities in other sectors is evident, which underlines the need for a financial supply ecosystem with complementary products emerging from blended finance strategy, converging grants, loans, guarantees and quasi-equity mechanisms (such as subordinated debt with flexible capital repayment schedule or/and interest depending on liquidity generated) which increases the availability of financial solutions and their accessibility at a lower

cost. It also illustrates that nonfinancial support structures would help CCCIs to raise their management and financial expertise in order to meet financial actors' expectations of high quality business plans and de-risking strategies on management and output.

The potential of impact investment in CCCIs is substantial, offering a unique combination of financial returns and positive societal contributions. By targeting investments that expand digital access, support sustainability, and drive innovation, impact, social and ESG investors can help accelerate economic development, improve social welfare, and contribute to a more inclusive, connected world. With the global push towards digital transformation, the CCCI sector holds immense promise in achieving long-term, meaningful impact.

Appendix 1. UN Task Force on Social economy – Technical group on finance: Proposals increasing institutional recognition and attention

Increasing institutional recognition and attention towards SSEs presents a significant opportunity to address the financial challenges and needs of CCCIs as SSE entities, such as CCCIs. The following sources provide insights into how this growing recognition can translate into tangible benefits for SSE financing:

Fostering a more enabling policy environment: governments and policy makers can play a critical role in creating a supportive environment for SSE financing. Increased institutional recognition can lead to:

- Development of tailored legal and policy frameworks: clear legal frameworks recognizing and supporting various SSE entity types can reduce ambiguity and uncertainty, fostering their development and attracting investment.
- Expansion of public policy support for SSE: increased awareness and recognition can motivate governments and parliaments to adopt comprehensive SSE legal frameworks, targeted action plans, and strategies that provide direct and indirect financial support to SSE entities.
- Integration of SSE into national and regional development plans: This can lead to increased allocation of public resources for SSE initiatives, ensuring a more systematic approach to supporting SSE financing.

Improving Access to Traditional and Innovative Finance:

- Increased awareness and understanding of SSE among traditional financial institutions: this can encourage traditional banks to develop tailored financial products and services suited to the unique needs and characteristics of SSE entities.
- Greater willingness to adapt measurement systems: with a better understanding of SSE's social and environmental impact, financial institutions can adjust their KPIs and assessment criteria to effectively evaluate the performance and impact of SSE projects.
- Incentivizing the mobilization of financing and savings to finance social impact SSE projects, following the examples of France and Quebec, which offer fiscal incentives to investors aiming at supporting and accompanying projects with a relevant social impact.
- Mobilization of development finance: multilateral development banks and development finance institutions can play a vital role in supporting SSE entities, especially in developing countries. Increased institutional recognition can push these institutions to adapt their tools and strategies to cater to the needs of smaller, social-focused SSE initiatives.

Strengthening the SSE Ecosystem

- Enhancement of non-financial support: greater institutional recognition can lead to increased provision of capacity building, technical assistance, and training programs for SSE entities, empowering them to navigate financial systems, develop robust business plans, and effectively measure and report their impact.
- Cofinancing technical support for better business plans and strategic studies may help managers who are often experts in their field of activity, but less so of management and financing tactics. This may bridge a large part of the gap between lenders' expectations and the financing needs of SSE initiatives.
- Promotion of collaboration and partnerships: a more supportive institutional environment can facilitate stronger partnerships between SSE entities, governments, financial institutions, and investors, creating a more cohesive and dynamic ecosystem for SSE financing, and by implication CCCIs.

Appendix 2. The FISIQ

While not specifically dedicated to connectivity projects, the FISIQ is an innovative financial player that could inspire a sectorial connectivity fund. The Quebec International Solidarity Investment Fund (FISIQ) aims to complement the cooperative activities of international cooperation organizations (ICOs) and provide a financial support tool for the organizations they support in the Global South that engage in social economy or income-generating activities. It represents an innovative way of pooling hybrid public-private financial capacity to support Canada's feminist international cooperation policy. The Quebec International Solidarity Investment Fund (FISIQ) is dedicated to supporting small and medium-sized social economy enterprises (collective enterprises, cooperatives, associations, and mutualists) in the Global South by providing or facilitating the obtaining of loans and loan guarantees. The businesses ultimately targeted by this fund are production organizations that partner with Quebec ICOs in their projects supporting income-generating activities. This Fund has a capitalization of $5 million, the majority of which would come fromIICO own equity, which is invested as loans to the FISIQ (at an annual rate of 5% without guarantee) and a government participation via a nonrefundable grant.

The mission of the Quebec International Solidarity Investment Fund is to promote access to the financial and technical resources necessary for the social, economic, feminist, equitable, and sustainable development of communities in the Global South. It provides a lever for sustainable development for collective enterprises in the Global South, for community autonomy, for the economic empowerment of women and youth, and for the revitalization of local financing structures.

It fosters dialogue between social and solidarity economy organizations in the Global South and their local community funders by sharing funding, risk, and returns with the latter. It expands its cooperation offerings in partnership with Quebec's OCIs, which support these initiatives in convergence and as part of their normal technical cooperation programs with NGOs in the Global South. It takes into account criteria of social justice, environmental sustainability, and

responsible economic performance in its mode of action and in the selection of supported projects. The FISIQ aims to support young, female, and entrepreneurial populations in developing communities, enabling them to take charge of their own development. It is a private, independent co-financing and guarantee mechanism.

Its investment policy provides possibilities of loan, loan guarantee and equity. It aims to act together with local financial institutions to reduce the risk as assessed by them, offer guarantee or sub-guaranteed loans in perspective of strengthening the social economy enterprises' balance sheet and help to build a financial history and relation between local enterprises and local financial actors.

Quebec International Solidarity Investment Fund (FISIQ) have the following objectives:

a. To create, maintain, develop, and safeguard viable income-generating activities that are socially useful and offer better living conditions, including those derived from family farming, small businesses, processing, or the provision of quality services.

b. To enable collective business projects to access financial resources that meet their needs under conditions equivalent to those available to other types of businesses.

c. To foster the development of sustainable, mutually beneficial business relationships between producer organizations and local financial institutions with a view to the long-term development of their autonomy and their contribution to the creation and sharing of wealth.

d. To facilitate the empowerment of groups and communities over the economic and social development of their communities by providing them with access to all forms of credit dedicated to microenterprises.

e. Promote the integration of socially responsible principles into the management choices of financed companies and integrate monitoring indicators and the evaluation of its impact.

The role of the international cooperation organizations (ICO) in the FISIQ process is central to its deployment strategy and cost control. Established in response to a need expressed by Quebec cooperation, the FISIQ derives its relevance and its primary market

from the cooperation activities of Quebec's ICOs. The definition of the role of the ICOs is guided by the following elements:

1. Respect for the North/South partnership relationship: The FISIQ keeps a certain distance, while ICOs maintain close partnership relationships.
2. Support capabilities (availability and capacity): The partner ICO must have clear potential to become a support provider in monitoring FISIQ operations.
3. The support function: From the perspective of the FISIQ's funding, the support function of ICOs should be viewed as "risk management." In fact, support activities should allow for regular monitoring of funded organizations, the anticipation of difficulties, and, when required, the implementation of recovery plans.
4. The role of the OCICOs should therefore be:
   - Search for opportunities aligned with the mission, performance, and social impact;
   - Identification of investment opportunities;
   - Preliminary institutional and social analysis of potential investment targets;
   - Recommendation of the partner on investment project where they are involved;
   - Organizational and documentary monitoring;
   - Social impact monitoring.

The FISIQ is open to all ICOs (who invested or not in the fund) and may even occasionally fund projects from other organizations sharing the same values. The viability criteria of the funded organizations and the monitoring capacity of the ICOs remain essential, however. The FISIQ's official policy must be open, but the social, financial, and operational investment selection process risks sometimes leading to a concentration scenario with stronger ICOs. As of today, the FISIQ has made seven loans totalling 2,3 million $ without any loss after three years of operation.

4 Building an Impact Investing Market for Community-centered Connectivity

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Connect Humanity

4.1 Introduction

Access to meaningful internet connectivity is increasingly recognized as a foundation for economic inclusion, education, healthcare, and civic participation. Yet billions remain unconnected, particularly in rural, low-income, and marginalized communities. Connect Humanity, a philanthropic investment organization, addresses this gap through a community-centric financing approach, which channels catalytic capital to community networks and locally rooted Internet Service Providers (ISPs) that are building connectivity solutions where market-driven actors fail to reach. Rather than relying on top-down infrastructure projects, Connect Humanity supports bottom-up digital infrastructure, where communities design, deploy, and govern the networks that serve them. Over the past two years, Connect Humanity has developed and deployed a tailored investment framework to evaluate and fund these networks—partnering with ISPs across Latin America, Africa, and Asia to surface what it takes to responsibly invest in the global digital equity frontier.

This paper presents the first cross-sectional analysis of community-centered internet providers across the Global South through the lens of investability. While much of the discourse around digital inclusion emphasizes infrastructure gaps or regulatory hurdles, little attention has been given to how these networks perform as financially viable, socially impactful investment opportunities. The rationale behind this study is to reframe community networks as emerging infrastructure enterprises with scalable potential, not as grant-dependent experiments. By systematically underwriting nine diverse networks across various regions, we highlight the pathways through which these community ISPs can attract capital and contribute meaningfully to the global mission of digital equity and sustainable development.

4.2 Methodology

Our research methodology is grounded in Connect Humanity's practical due diligence and underwriting of nine community-centered ISPs across the world. Each ISP was evaluated using a structured Investment Risk Framework that assessed five key dimensions: Network Technical Risk, Community Engagement, Business Model Strength, Legal & Compliance, and Portfolio Fit. This due diligence methodology has been tested in a North America context, with no credit defaults to date.

Each dimension is evaluated through specific subfactors and assigned a numerical score where lower scores indicate lower risk, including:

- **Network Technical:** principals, network design (uplink, distribution, access), believability of network rollout), support and operations.
- **Community Engagement:** need/digital equity gap, approach to community engagement.
- **Business Model:** sources and uses of capital, revenue model, cost structure, financial performance.
- **CH Portfolio:** size of investment, type of investment, impact on broader portfolio economics, source of capital, duration/repayment.
- **Legal and Compliance:** age and sophistication of company, financial review and understanding, internal control environment, contingent liabilities and legal status, executive management review.

These scores are aggregated to produce a total risk rating, categorized as A (Low Risk: 15-26), B (Some Risk: 27-39), C (Material Risk: 40-54), or D (Not Aligned: 55-66). Lower scores mean lower risk. The framework is designed for a diverse range of ISPs, including community-centric vs non-community centric ISPs and early- vs late-stage ISPs operating in underserved markets. The framework is intended to remove biases in traditional underwriting that often overlooks contextual complexity and social value of community-oriented broadband.

The methodology combines quantitative scoring with qualitative context, capturing the unique social value, technical feasibility, and financing challenges of each network. Connect Humanity conducted in-depth interviews with leadership teams, reviewed technical diagrams, financial statements, community engagement plans, and deployment maps. The nine selected networks span different geographies (e.g., Latin/South America, Sub-Saharan Africa, Southeast Asia), governance

models (e.g., co-ops, nonprofits, family-owned ISPs) and stages of maturity. This comparative analysis provides not only a snapshot of individual investability but also a synthesis of the systemic enablers and barriers shaping the global community network ecosystem.

The nine community network initiatives selected included:

- **El Oasis; Colnodo (Colombia):** A veteran digital rights NGO supporting locally governed WiFi networks in rural Colombia, with a focus on gender equity, civic participation, and community digital autonomy.
- **Zenzeleni (South Africa):** A solar-powered, wireless community-owned network in South Africa's Eastern Cape, recognized for its strong governance, open-source ethos, and ability to deliver sustainable rural broadband.
- **Common Room (Indonesia):** A multidisciplinary Indonesian initiative combining community centers, IoT deployment, and WiFi networks across island villages, with deep roots in capacity building and digital literacy.
- **MyKCat (Philippines):** A profitable, 100% Filipino-owned fiber ISP operating in Negros Occidental, delivering high-speed broadband to underserved towns with strong subscriber growth and operational discipline.
- **TandaNet (Kenya):** A licensed community-based ISP rooted in Nairobi's informal settlements, blending digital skilling and internet service through a CBO model, with ambitions to scale via partnerships with global tech firms.
- **MAJI (Nigeria):** A grassroots digital justice organization in the Niger Delta using voucher-based WiFi networks to expand access, originally rooted in environmental monitoring and now evolving into a social enterprise.
- **AheriNet (Kenya):** A licensed community ISP serving informal settlements and schools in Kisumu County, with a hybrid wireless-fiber network and a mission to close the digital divide through affordable access.
- **IFS Sertao (Brazil):** A university-led initiative to build a fiber-backed community network in a remote quilombola region, supported by national operators and regulators through public-private infrastructure agreements.

- **TIC (Mexico):** A nonprofit telecom carrier enabling indigenous communities to build and operate their own mobile and internet networks, pioneering decentralized models through legal spectrum access and local governance.

These initiatives were selected by APC and Connect Humanity on the basis of representing a wide variety of network models within the typology of community-centred connectivity initiatives presented in the first chapter, spread around different regions and countries. All initiatives selected had in common that all had implemented mechanisms to sustain the connectivity over time.

4.3 Results

Of the nine networks analyzed, the majority were rated B (some risk) using Connect Humanity's Investment Risk Framework. Two achieved an A (low risk) rating, based on operational profitability, clean financials, and scalable governance structures. The rest fell into the C category, reflecting material risks related to unclear ownership structures, undefined long-term sustainability, or capacity gaps.

Table 4.1

Category	ISP 1	ISP 2	ISP 3	ISP 4	ISP 5
Network Technical	8/14	6/14	6/14	5/14	7 / 14
Community Engm't	1/5	2/5	1/5	2/5	1 / 5
Business Model	8/13	8/13	11/13	4/13	9 / 13
CH Portfolio Impact	7/17	13/17	12/17	8/17	12 / 17
Legal & Compliance	9/17	10/17	12/17	9/17	9 / 17
Total Risk Score	**33**	**39**	**42**	**28**	**38**

Table 4.2

Category	ISP 6	ISP 7	ISP 8	ISP 9	CH Port.
Network Technical	9/14	7/14	11/14	7/14	3.2/14
Community Engm't	2/5	2/5	3/5	1/5	0.6/14
Business Model	11/13	11/13	12/13	9/13	5/14
CH Portfolio Impact	11/17	9/17	9/17	12/17	9.8/14
Legal & Compliance	11/17	9/17	14/17	9/17	9.2/14
Total Risk Score	**44**	**38**	**49**	**38**	**27.8**

The analysis of nine community networks reveals a consistent pattern of strong social alignment, moderate technical reliability, and widely variable financial readiness. Across the five dimensions of Connect Humanity's Investment Risk Framework, the average total risk score was 38.8 (max 66) with a standard deviation of 6.1, placing most networks nearly between the "B – Some Risk" and "C – Material Risk" categories. While these networks are not yet fully investment-grade by conventional standards, their risk profiles show they are fundamentally viable with appropriate financial structuring and technical assistance.

The strongest performance came in Community Engagement, with an average score of 1.7 and a standard deviation of 0.7, indicating low risk. This reflects the embeddedness of these networks in their local contexts, their participatory governance models, and their track record of digital inclusion work with marginalized groups. Conversely, the Business Model category showed the highest average risk at 9.2 with the largest standard deviation of 2.1, indicating significant variation between networks. Some ISPs maintain positive cash flows and clear subscriber economics, while others remain heavily donor-funded or lack disciplined financial forecasting and projections.

Technical risk, averaging 7.3 with a standard deviation of 1.8, fell in the mid-range. Most networks use hybrid models of fiber, WiFi, LTE, and solar-powered mesh; technically credible designs, but in operating environments prone to infrastructure challenges such as power outages or storm damage. The analysis revealed strong technical credibility across networks (e.g., modular fiber-WiFi architectures), consistent local legitimacy, but limited capital readiness.

Legal and compliance risks, averaging 10.2 with a standard deviation of 1.7, typically stem from either incomplete registration structures or limited ability to access capital due to licensing complexity or organizational form (e.g., co-ops, NGOs).

When compared to Connect Humanity's existing portfolio of active investments, the nine community networks show both distinct strengths and predictable weaknesses. Notably, these community networks score similarly in Community Engagement, validating their core value proposition: trusted, locally governed infrastructure deeply aligned with digital equity outcomes.

However, the comparison also highlights meaningful gaps in investment readiness. The average Network Technical Risk score among the community networks is 4.1 points higher, almost two deviations, indicating less redundancy, limited network automation, and greater vulnerability to environmental disruptions. This suggests a need for investment not just in last-mile connectivity, but in resilience and monitoring capacity at the network core.

The most significant divergence lies in the Business Model dimension, where the community networks almost two deviations higher in risk compared to the broader portfolio. This is attributable to reliance on grants, the absence of audited financials, and limited experience with debt servicing or reserve planning. Other common challenges included regulatory bottlenecks and limited access to patient, flexible capital. However, most networks had real and growing user bases, with take-rates between 30–50% and demonstrated ability to monetize service via prepaid or subscription models. Addressing this gap will require pairing capital with technical assistance to build budgeting, pricing, and revenue management capabilities.

Together, these insights disaggregate prior held perceptions that community networks are not investable. Rather, community networks present a spectrum of organizations, some immediately investable while others requiring more scaffolding than traditional ISPs. The commonality is that they require investments structured differently and more aligned with their specific challenges. Their high social impact, strong demand, and small capital needs make them ideally suited for tailored, milestone-linked financing, especially when paired with patient, blended capital.

4.4 Analysis and Implications

The underwriting process surfaced several cross-cutting insights. First, demand for connectivity is not the problem: nearly every network reaches breakeven if allowed to deploy. Second, the greatest barriers are capital access, permitting friction, and execution capacity, not market viability. Most community networks are structurally excluded from capital markets: they lack collateral, operate at small ticket sizes ($50K–$300K), and are invisible to national broadband funds.

Consequently, 60–90% of deployments have been grant-funded, making them vulnerable to donor cycles and program timelines.

Third, success is closely tied to strong local leadership and embedded governance models. ISPs with proximity to the communities they serve have built trust and resilience even in resource-constrained environments. However, financial discipline, technical assistance, and institutional strengthening are necessary to scale these efforts. The implication is clear: for community networks to flourish, we need investment structures that are local, flexible, and catalytic, such as recoverable grants, revenue-based financing, and blended capital pools. Technical assistance must be paired with capital to close the maturity gap that prevents many networks from absorbing investment at scale.

Key themes of due diligence amongst the community networks that we saw include:

Demand Is Real, But Growth Is Constrained

- **Market gaps are undeniable:** Every network serves rural, low-income, indigenous, quilombola or peri-urban regions that are structurally ignored by commercial ISPs. In many areas, the only alternative is a 2G/3G handset or no service at all.
- **Latent demand is high:** Once deployed, networks commonly see significant take rates (>30-50%). Community buy-in is strong, particularly when pricing is fair and services are reliable.
- **Growth is not limited by demand, but by regulation and capacity:** Scale is often blocked by slow permitting, limited managerial bandwidth/capacity, and lack of access to working capital.

CapEx is the Bottleneck, Not OpEx

- **The biggest cash pinch is upfront:** Across nearly all networks, capital for towers, fiber drops, CPE, and OLTs is the main barrier. Post-deployment burn rates are relatively modest and typically manageable vis-a-vis operating revenue.
- **Capital needs are smaller than expected:** Most buildouts require $50K–$300K, impact transaction costs. While modest, especially when compared to typical infrastructure investments, this capital goes a long way.

Capital Access is Severely Limited

- **Bank financing is largely inaccessible:** Local lenders require land collateral or cash flow history that small networks don't have. National broadband funds often exclude small players through eligibility or administrative complexity.
- **Grants have filled the gap:** ~60–90% of buildouts have been grant-funded (APC, ISOC, EU, local NGOs), but this model is not sustainable or scalable.
- **Revenue-based or other structured credit** is likely the most viable path forward for most investable networks.

Execution and Governance Are Uneven

- **Technical infrastructure is rarely the problem:** Nearly all networks have deployed credible designs using hybrid fiber, wireless, or LTE. Examples include MyKCat's redundant IXP-connected fiber ring and Zenzeleni's solar mesh network.
- **Financial management and forecasting are often weak:** While mature community networks analysed have clean books and clear projections, many others remain project-based with a "non-profit, grant-dependent mentality", with limited forecasting capabilities.
- **Leadership matters:** Networks with strong, embedded, mission-aligned founders consistently outperform peers with diffuse or rotating governance.

Structure and Ownership Models Vary Widely

- **Decentralized governance is common:** Many networks are co-ops, associations, or nonprofits with distributed decision-making and community boards. While this builds trust, it often slows execution and business capacity building.
- **Equity is frequently off the table:** Legal or political restrictions (e.g., foreign ownership rule) make equity infeasible, increasing the need for tailored credit.

Talent Pipelines Are Emerging but Need Support

- **Several networks are investing in local capacity:** Programs in TIC, IFS Sertão, and Zenzeleni are training youth, volunteers, and/or professionals in technical operations. However, scaling these efforts requires funding and formalization.

Transaction Cost Is a Hidden Barrier

- **Low ticket sizes and high diligence friction** are the primary reasons commercial investors avoid this segment. With capital needs often below $250K, minimizing transaction cost and maximizing speed and flexibility are essential for any funder entering this space.

Despite operating in highly resource-constrained settings, nearly all networks have deployed technically sound infrastructure, often using modular, hybrid designs that combine fiber, wireless, and LTE/MVNO access. The technical layer is rarely the primary weakness. However, financial sophistication and capitalization vary widely. Only a few are profitable or investment-ready at scale.

The financing opportunity to close the global digital divide is real, but unlocking it requires patient capital, risk-aligned instruments, and stronger operational readiness across the board. A programmatic approach that pairs small-scale, milestone-based financing with TA and flexible repayment structures appears best positioned to meet the sector where it is and move it toward scalable, investable maturity.

4.5 Implications for "Fit for Purpose" Financing

Across nearly all cases, traditional debt would not be appropriate unless deeply customized. Instead, risk-sharing, longer tenors (5–7 years), and milestone-based disbursements would be critical to aligning incentives and reducing risk.

Table 4.3

Illustrative Instruments	Best For
Revenue-Based Financing (RBF)	Networks with recurring revenue and moderate financial systems in place: • ISPs with at least 12–24 months of operating history, active subscriber billing, and strong operational foundation. • Operators that can track and report monthly revenue, even if financial controls are informal but reliable. • Networks seeking growth capital for expansion into adjacent markets with clear breakeven paths.
Recoverable Grants	Mission-aligned networks with social mandates but early-stage business maturity: • Community networks operating as nonprofits or cooperatives, where capital recovery depends on donor/funder flexibility. • Ideal for pilot-stage deployments or high-impact digital equity programs without reliable cash flow. • Organizations with strong local legitimacy but no collateral, formal loan capacity, or prior borrowing history.

Illustrative Instruments	Best For
Blended Capital Pools	Decentralized networks or portfolios of small deployments that need scale and risk layering: • Federated or multi-community models where shared back-end support and TA reduces individual project risk. • Networks where grant funding can de-risk early-stage operations while repayable capital supports scale-up. • Appropriate when working through intermediaries, umbrella NGOs, or consortia coordinating multiple CNs.
Bridge-to-Permitting Debt	Networks with proven deployment models but slow regulatory approvals: • ISPs that face multi-month delays between permitting and buildout. • Operators with clear pipeline and track record of securing permits, but limited capital to pre-fund infrastructure or community outreach. • Can be structured as tranches linked to permitting milestones, mitigating idle capital risk.
TA-Linked Capital	Networks with strong community traction but lacking operational maturity: • Early-stage CNs with promising demand but gaps in financial modeling, governance, or network planning. • Organizations that can execute with support, especially in transition from donor-funded pilot to revenue model. • Useful for networks where organizational strengthening is as critical as the capital itself.

4.6 Recommendations to Catalyze Impact Investors

1. **Aggregate Demand via a Facility or Fund.** Individual community networks are often too small for most investors. A global or regional fund that bundles 10–30 networks under a single investment thesis could create scale, standardization, and portfolio diversification.
2. **Blend Capital to Absorb First-Loss Risk.** Philanthropic or catalytic investors can provide grants or junior capital to de-risk senior debt. This structure would allow more commercial capital to participate, particularly DFIs or impact lenders.
3. **Build Standardized Diligence and Reporting Tools.** Many networks lack audited financials or formal governance documents. A toolkit for shared due diligence, financial forecasting, and impact measurement would streamline underwriting and reduce transaction costs.
4. **Leverage Public Subsidy or Anchor Buyers.** Governments and anchor institutions (e.g., schools, health clinics) can co-finance networks through service contracts. This demand-side revenue underwriting can improve the network's bankability.

5. **Tell a Better Story.** These networks are more than last-mile ISPs, they are platforms for education, entrepreneurship, and civic engagement. Packaging community networks as "social infrastructure" could tap into climate, sustainability, gender, and digital rights capital flows.
6. Most critically, we need one or several patient funders willing to provide capital to test and build what works. There will be nuances and differences in financing community networks across regions, countries, and even provinces. We need the space to iterate the underwriting and structuring while developing a larger body of loan performance data. Once loan performance data hits critical mass, we would expect more impact investors, institutional credit, DFIs, and even local banks to get more involved in financing community networks.

4.7 Conclusion

Community networks represent a powerful, locally rooted response to global digital inequality. They are technically viable, socially embedded, and often the only source of meaningful connectivity in remote or underserved areas. Yet they remain excluded from traditional financing systems; starved of capital not because they are unviable, but because our financing tools have not evolved to meet their realities.

Our analysis indicates that, with the right investment structures and support systems, community ISPs can scale sustainably, improve livelihoods, and advance the goals of universal digital inclusion. What they need now is a shift in perception: from unsustainable micro-non-profit to high-impact, undercapitalized asset class.

With the right mix of donors, development finance institutions, and mission-aligned investors, we have the opportunity to recognize community networks not as fringe actors, but as essential infrastructure builders, and to join in creating the investment vehicles that can unlock their full potential for inequality reduction and sustainable development.

5 Conclusion: Towards a Diversified Ecosystem of Innovative Financing and Investment Models

Mike Jensen, Anriette Esterhuysen and Josephine Miliza

Although the 2005 WSIS Tunis Agenda already includes the importance of "supporting [...] networking initiatives based on local communities," the reality is that over the last 20 years, progress has been slow, and community-centred connectivity initiatives have for the most part, emerged despite relatively challenging environments. The majority of policy makers, regulators and financiers in the sector have not extended their approach beyond the narrative that large commercial enterprises are the primary model for the provision of telecommunication services. Hence, licensing frameworks and financing instruments continue to privilege private sector participation in the industry. While this approach has undoubtedly led to competitively driven extension of infrastructure in urban areas, it has not been effective in closing the digital divide, which still leaves the majority of the world's population with either no connectivity or connections that are unaffordable. Furthermore, as the COVID-19 pandemic has shown[95], the divide is intensifying.[96]

As long as policy makers and regulators continue to rely on traditional players and private investment approaches that prioritise profitability, these divides will continue to widen. Clearly we need a different approach from traditional development finance, and additional sources of finance from non-traditional investors using innovative and flexible financial mechanisms, along with a regulatory environment that allows complementary network operators that are socially focused on bridging the digital divide, as opposed to solely focused on profitability, to emerge. Ultimately, to improve the balance between profit maximisation and the goal of reaching universal access, the time has come to assess socially driven investments in depth and review how effective they are at addressing digital inclusion.

95 Even though the absolute number of people connected is slowly increasing, the impact of COVID-19 in driving services, employment and social interactions online has increased our overall societal dependence on digital infrastructure. This means that all those without affordable access are at an increasing disadvantage. Rising demand for broadband also means that those with only weak or unaffordable connectivity who might otherwise have been considered connected are still without meaningful access.

96 Brito, C. (2020, 24 September). COVID-19 has intensified the digital divide. World Economic Forum. https://www.weforum.org/agenda/2020/09/covid-19-has-intensified-the-digital-divide.

As mentioned above, while some community-centred connectivity providers are steadily building solutions to persistent digital divides, their relatively small size and limited numbers underscore the struggle to access capital to expand or seed new networks. While there have been some good examples of innovative financing mechanisms to support community-centred connectivity providers, the financial resources currently available are insufficient to help them scale up.

The evidence from the chapters in this volume indicates that this is an opportune moment to show those stakeholders willing to help close digital divides recognise that community-centred models are not receiving enough attention, and that there needs to be more proactive engagement in supporting these complementary solutions which are critical to ensuring the inclusion of rural communities and marginalised groups such as women and Indigenous communities, as well as the most financially disadvantaged.

In order to be successful, effective financing mechanisms need to be part of a general enabling environment for community-centred operators. But the centrality played by private companies in the telecommunications sector, and their success in expanding services to the market frontier, distracts from the need to also create an enabling environment for other alternatives. Because of this, it is critical that digital exclusion is considered by all financial actors and public entities as a development problem that transcends the dynamics of the commercial telecommunications industry. Despite the growing recognition that community-centred approaches are effective, as discussed in the Introduction to this volume, much needs to be done to raise awareness of community-driven alternatives to bridging the digital divide, and how to create innovative, affordable and flexible financial products that enable them to sustain their businesses.

To address these funding constraints, there is a strong need to create an enabling and flexible policy, regulatory and financing environment that encourages the emergence of more community-led initiatives, as well as more innovative local and regional investment models for these providers that allows them to expand and operate cost-effectively.

Since 2017, the APC-Rhizomatica LocNet initiative[97] has worked with community-centred connectivity providers, policy makers and regulators to develop enabling frameworks. The key elements that have emerged to ensure an enabling financial and regulatory environment are:

- **Deepen insight into the value of a diversified ecosystem**. Acknowledging the failure of traditional operator models to close digital gaps, and exploring complementary efforts with business models more tailored to underserved areas is critical. For example, the Communications Authority in Kenya[98], and Anatel in Brazil[99] have commissioned work to explore enablers for community-centred connectivity initiatives. Similarly, the Data Services Market Inquiry from the Competition Commission in South Africa recommended incentivizing diversity via community networks[100]. Anatel has gone one step further by creating in 2023 a Working Group which supports continued dialogue with these initiatives to operationalize enablers for them[101].
- **Reduce the regulatory requirements for these providers**. Hefty licence fees and compliance requirements for network operators exist in most countries from the Global South. This contrasts with regulatory frameworks in developed markets which are characterized by a simple authorisation or registration systems permitting internet service provision without a licence. Lowering licence fees, or waving them, and reducing administrative burdens, are among the most important incentives[102]. In Kenya, most of those incentives exist via a new Community Network and Service

97 Association for Progressive Communications. *Digital Inclusion*. Accessed April 2, 2025. https://www.apc.org/en/our-work/themes/digital-inclusion.

98 Communications Authority of Kenya, *Licensing and Shared Spectrum Framework for Community Networks*, May 2021, https://repository.ca.go.ke/bitstream/handle/123456789/47/Licensing-and-Shared-Spectrum-Framework-for-Community-Networks-May-2021.pdf?sequence=1.

99 Labardini Inzunza, Adriana. *Policy Brief and Recommendations for an Enabling Environment for Community Networks in Brazil*. Association for Progressive Communications. November, 2021. https://sei.anatel.gov.br/sei/modulos/pesquisa/md_pesq_documento_consulta_externa.php?eEP-wqk1skrd8hSlk5Z3rN4EVg9uLJqrLYJw_9INcO7Pwj-3IV1l7IHgYMB-bbrYeBUxe1cWNVSkPuk8jN_6nkpj_OiAnYbrUD2KgGMhro4XY785bcVkb50mNt5TGB4F.

100 Competition Commission of South Africa. *Data Market Inquiry: Summary*. 2019. http://www.compcom.co.za/wp-content/uploads/2019/12/Data-Market-Inquiry-SUMMARY.pdf.

101 Agência Nacional de Telecomunicações (Anatel). "GT RCom." Accessed April 4, 2025. https://www.gov.br/anatel/pt-br/composicao/grupos-de-trabalho/gt-rcom.

102 International Telecommunication Union (ITU). *Global Symposium for Regulators 2021 Best Practice Guidelines*. 2021. https://www.itu.int/en/ITU-D/Conferences/GSR/2021/Documents/GSR-21_Best-Practice-Guidelines_FINAL_E_V2.pdf.

Licence[103]. In South Africa, initiatives have used the license-exempt regulations, while a more robust framework is designed[104]. This is the case in the Philippines too[105], and in Brazil an authorization under the Service of Restricted Interest category[106] is available. In Colombia the government has issued a decree with a special regime for these initiatives, with a five year exemption of official fees[107].

- **Adopt innovative mechanisms** to allow community-centred connectivity providers access to radio frequency spectrum that is either unused or unassigned in underserved areas. Mobile spectrum sharing has become widespread in the global North[108], but adoption in the global South, where it is most needed[109], is still the exception. Nevertheless there are some examples of this which set important precedents for other countries – for example in Mexico a social purpose mobile spectrum license was pioneered[110], and in Colombia experiments have been authorized and monitored by the relevant authorities to enable this possibility[111]. In Brazil, an authorization for mobile spectrum on

103 Communications Authority of Kenya. *Community Network and Service Provider Licence*. Accessed April 4, 2025. https://www.ca.go.ke/sites/default/files/CA/Licenses%20Templatses/Community%20Network%20and%20Service%20Provider%20Licence.pdf.

104 Government of South Africa. *Next-Generation Radio Frequency Spectrum for Economic Development*. 2024. South African Government Gazette No. 50725 on May 28, 2024.

105 Senate of the Philippines, "Cayetano-sponsored bill for nationwide internet access gets Senate nod," press release, February 6, 2025, https://legacy.senate.gov.ph/press_release/2025/0206_cayetanoa2.asp.

106 Agência Nacional de Telecomunicações (Anatel). *Redes Comunitárias: Universalização das Redes de Telecomunicações*. n.d. https://www.gov.br/anatel/pt-br/regulado/universalizacao/redes-comunitarias.

107 Ministerio de Tecnologías de la Información y las Comunicaciones (Ministerio TIC), "Publicación Decreto Internet Comunitario Fijo," accessed April 4, 2025, https://www.mintic.gov.co/portal/inicio/Sala-de-prensa/Noticias/276726:Publicacion-decreto-internet-comunitario-fijo.

108 Innovation, Science and Economic Development Canada (ISED). *Decision on Non-Competitive Local Licensing Framework, Including Spectrum in the 3900–3980 MHz Band*. Accessed April 4, 2025. https://ised-isde.canada.ca/site/spectrum-management-telecommunications/en/spectrum-allocation/decision-non-competitive-local-licensing-framework-including-spectrum-3900-3980-mhz-band-and.

109 United Nations Broadband Commission for Sustainable Development. *21st Century Financing Models: Broadband Commission*. 2021. https://broadbandcommission.org/wp-content/uploads/dlm_uploads/2021/11/21st-Century-Financing-Models-Broadband-Commission.pdf.

110 Song, Stephen; Rey-Moreno, Carlos; and Jensen Michael, *Innovations in Spectrum Management*, 2019, https://www.internetsociety.org/resources/doc/2019/innovations-in-spectrum-management/.

111 Agencia Nacional del Espectro (ANE), *Documento de Análisis del Árbol de Problemas para la Maximización del Uso del Espectro Radioeléctrico* (Bogotá: ANE, July 2022), accessed April 7, 2025, https://www.ane.gov.co/Sliders/archivos/gesti%C3%B3n%20t%C3%A9cnica/Estudios%20de%20gesti%C3%B3n%20y%20planeaci%C3%B3n/Maximizar%20el%20uso%20de%20espectro/Documentos%20para%20consulta/DocumentoArbolProblemaMaximizacion.pdf.

a secondary basis has been recently created[112]. South Africa has also enacted policy to enable community-centred connectivity initiatives access to unused mobile spectrum[113].

- **Ensure affordable access to backhaul networks.** Securing sufficient backhaul capacity is often the single largest cost element for small networks, especially where affordable access to national backbones and middle-mile fibre networks is limited or not competitively priced for small-scale operators. Examples of this enabler are scarce, with the notable exception of the Palapa Ring in Indonesia[114].
- **Raise awareness and build capacity.** These are required to develop the pipeline of socially-driven initiatives that could effectively use the aforementioned incentives to close the digital divide. Examples to raise awareness exist in Brazil, with a website on community networks maintained by the regulator[115], and similarly in Colombia[116]. The LocNet Initiative[117] and the Internet Society[118] maintain similar resources and facilitate capacity building. Courses available in the ITU Academy are also critical[119].

The last element of this enabling framework is to **Establish innovative financing and investment models** for community-centred operators to catalyze their impact. For this, one option would be through Universal Service Access Funds, which should be strategically designed and implemented to address key barriers to meaningful connectivity, including gender and socio-economic gaps. The UN Broadband Commission has already recommended community

112 Agência Nacional de Telecomunicações (ANATEL). *Ato nº 17.985, de 5 de julho de 2024*. 2024. Accessed April 7, 2025. https://informacoes.anatel.gov.br/legislacao/atos-de-requisitos-tecnicos-de-gestao-do-espectro/2024/1999-ato-17985.

113 Government of South Africa. *Next-Generation Radio Frequency Spectrum for Economic Development*. 2024. South African Government Gazette No. 50725 on May 28, 2024.

114 *Palapa Ring Barat*, accessed April 7, 2024, https://prb.net.id/.

115 Agência Nacional de Telecomunicações (Anatel). *Redes Comunitárias: Universalização das Redes de Telecomunicações*. n.d. https://www.gov.br/anatel/pt-br/regulado/universalizacao/redes-comunitarias.

116 Colnodo. "Redes Comunitarias en Colombia." Accessed April 4, 2025. https://www.redescomunitarias.co/.

117 Association for Progressive Communications (APC). "Community Networks Learning." Accessed April 4, 2025. https://cnlearning.apc.org/.

118 Internet Society. "Community Network DIY Toolkit." Accessed April 4, 2025. https://www.internetsociety.org/resources/community-network-diy-toolkit/.

119 International Telecommunication Union. "Digital Inclusion of Indigenous Peoples." Accessed April 7, 2025. https://www.itu.int/en/ITU-D/Digital-Inclusion/Indigenous-Peoples/Pages/default.aspx.

networks to be funded by USF[120]. Argentina was a pioneer in this approach[121], Brazil[122] and Kenya[123] have recently authorized it, while in Indonesia, initiatives are supported by Village Funds from the Ministry of Villages for connectivity projects[124]. In Colombia, the European Commission's Global Gateway is funding community-centred connectivity in demilitarized zones under the peace process[125].

Additionally, community-centred initiatives are also using other financing mechanisms such as demand aggregation, blended finance, concessional loans, credit guarantees, development/social impact bonds[126]. However, these efforts require private and public financiers to adapt financial products for these initiatives, which are so different in scale and objectives compared to the large infrastructure investment projects they traditionally fund.

In that regard, this book has demonstrated the transformative potential of Community-Centred Connectivity Initiatives (CCCIs) in advancing digital inclusion, economic participation, and social impact. Despite the high capital requirements and operational challenges these initiatives face, their ability to provide meaningful connectivity and bridge the digital divide in a more cost-effective way, and foster local ownership sets them apart as powerful drivers of equitable digital transformation.

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120 United Nations Broadband Commission for Sustainable Development. *21st Century Financing Models: Broadband Commission*. 2021. https://broadbandcommission.org/wp-content/uploads/dlm_uploads/2021/11/21st-Century-Financing-Models-Broadband-Commission.pdf.

121 ENACOM (Ente Nacional de Comunicaciones). *Convocatoria para la adjudicación de Aportes No Reembolsables para el sesarrollo de Infraestructura de internet a través de Redes Comunitarias Programa "Roberto Arias"*. May 23, 2023. https://www.enacom.gob.ar/multimedia/noticias/archivos/202305/archivo_20230523045957_7544.pdf.

122 Teletime. "GT da Anatel quer redes comunitárias entre projetos financiáveis pelo Fust." March 26, 2025. https://teletime.com.br/26/03/2025/gt-da-anatel-quer-redes-comunitarias-entre-projetos-financiaveis-pelo-fust/.

123 Communications Authority of Kenya. Universal Service Fund Strategy 2023–2027. Nairobi: Communications Authority of Kenya, 2023. https://www.ca.go.ke/sites/default/files/CA/USF%20Strategy/Universal%20Service%20Fund%20Strategy%202023-2027.pdf.

124 Kementerian Desa, Pembangunan Daerah Tertinggal, dan Transmigrasi Republik Indonesia (Kemendes PDTT). 2020. *Peraturan Menteri Desa, Pembangunan Daerah Tertinggal, dan Transmigrasi Nomor 13 Tahun 2020 tentang Prioritas Penggunaan Dana Desa Tahun 2021*.

125 Ministerio de Tecnologías de la Información y las Comunicaciones (MinTIC). "Conectando a los no conectados", proyecto del Ministerio TIC con la Unión Europea y Colnodo para la reducción de la brecha digital en zonas rurales de Colombia. Last modified May 9, 2025. https://www.mintic.gov.co/portal/inicio/Sala-de-prensa/Noticias/401110:Conectando-a-los-no-conectados-proyecto-del-Ministerio-TIC-con-la-Union-Europea-y-Colnodo-para-la-reduccion-de-la-brecha-digital-en-zonas-rurales-de-Colombia.

126 Connectivity Capital. *Financing Mechanisms for Locally Owned Internet Infrastructure*. Association for Progressive Communications, 2021. https://www.apc.org/sites/default/files/financing-mechanisms-for-locally-owned-internet-infrastructure.pdf.

This book is the Official 2025 Outcome of the Dynamic Coalition on Community Connectivity (**DC3**) of the United Nations Internet Governance Forum (IGF). DC3 is a multistakeholder group, fostering a collaborative analysis of **community networks** (CNs), exploring how such initiatives can improve and expand connectivity while empowering Internet users.

CNs are connectivity initiatives usually developed in a bottom-up fashion by groups of individuals – i.e., communities – that may contribute to the design, development and management of the network infrastructure as a common resource. Hence, CNs are usually managed according to the governance models established by their community members and may be operated by groups of self-organised individuals or entities such as non-governmental organisations (NGOs), local businesses or public administrations.

CNs should not be considered as a competing or antagonistic model either to the state or to the market. On the contrary, they should be seen as a powerful complementary solution to fill the existing connectivity gaps. Over the past decade, the CNs debate has evolved considerably, and the discourse surrounding these initiatives has undergone significant transformation. This evolution reflects a shift from grassroots technical experimentation to the recognition of CNs as essential instruments for digital inclusion, sovereignty, and cybersecurity, all underpinned by sustained community engagement. These issues have been systematically studied in previous DC3 annual reports, which have analysed the conceptual, regulatory, and operational frameworks for CNs through a rights-based, community-centric approach. All previous DC3 publications can be found at **www.comconnectivity.org.**

Understanding how the community connectivity debate has evolved is essential to understand why the identification of self-sustaining financial solutions is probably the most important issue to be addressed and why such solutions may have a remarkably relevant impact for the future of connectivity. In this perspective, this volume offers a collection of evidence-based analyses and some concrete proposals aimed at promoting self-sustaining financing solutions for Community Connectivity.