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Chapter

Smart Rural Communities: Action Research in Colombia and Mozambique

Igor Calzada

Abstract

This chapter contributes to the discussion on contemporary rural development programs, with a focus on their alignment with the sustainable development goals (SDGs) in the Global South. The study examines an action research project led by Ayuda En Acción, in collaboration with co-operatives under the Mondragon Co-operative Corporation (MCC) such as Mundukide Foundation, Alecop, and LKS. The research was conducted in postconflict rural areas in Colombia's Bolivar region and remote rural settlements in Mozambique's Cabo Delgado province. The intervention aimed to engage local communities by incorporating information and communication technologies (ICTs) for the well-being of rural residents. This chapter presents the action research fieldwork, critical analysis of the smart cities' hegemonic discourse, and final recommendations while introducing the concept of Smart Rural Communities (SRC). The research question asks how to establish the SRC framework as an international cooperation model that meets the SDGs. The chapter includes an (i) introduction, (ii) literature review, (iii) presentation of the fieldwork in Colombia and Mozambique, (iv) findings through a SWOT analysis, and (v) final policy recommendations for the SRC framework. The SRC framework provides valuable insights for international cooperation models to achieve the SDGs in rural areas, particularly in the Global South.

Keywords: smart rural communities, action research, SDGs, Colombia, Mozambique, global south, living labs, social innovation; rural studies; digital transformation; urban transformations; smart cities; smart villages

1. Introduction

This chapter introduces a new experimental policy intervention model called 'Smart Rural Communities' (SRC), which challenges the three main joint pillars of the SDGs policy (cities, villages, and citizens) that have become popular in the Global North. SRC was driven by action research and social innovation and was conducted with the leadership of the NGO Ayuda En Acción in collaboration with three co-operatives that belong to the Mondragon Co-operative Corporation based in the Basque Country (Spain): Mundukide Foundation, Alecop, and LKS Engineering.

01   The fieldwork action research was conducted between June and August 2017 in
02 two locations in the Global South to explore the potential technological empowerment
03 among rural dwellers living in vulnerable communities and remote settlements [1–4].
04 Specifically, this chapter examines and compares a postconflict area located in Bolivar,
05 Colombia (Latin America) and a newly developed and scattered area located in
06 Pemba, Mozambique (Africa). Through an insightful intervention, the author
07 shapes this experimental model entitled SRC based on qualitative fieldwork action
08 research [5].
09   Furthermore, this chapter revolving around SRC as an experimental intervention
10 model not only aims to challenge the postcolonial smart city rationale imposed from
11 the Global North but also seeks to establish an ad-hoc contextualized version for rural,
12 vulnerable, remote, and communities based on Living Labs [6–8].
13   Hence, the research question of this paper is whether a new development
14 model for international cooperation is feasible by experimenting through Living
15 Labs with SDGs in the Global South. This research question was presented and
16 discussed in the Summer School Smart Rural Communities that took place on 12–13
17 September 2019 in San Sebastián, Basque Country, Spain (https://www.uik.eus/es/
18 node/5812/pdf). This would enable digital transformational processes to be
19 implemented as grassroots innovation in collaboration with remote and rural
20 communities dwellers.

21 ## 2. Literature review: from smart cities to SRC

22   In the Global North, corporate smart-city rhetoric portrays technology as a catch-
23 all solution for social, economic, and environmental urban issues [9–14]. A politicized
24 point of departure encourages tabula-rasa interventions and replaces as hegemonic
25 the normative rationale behind the notion that smart urbanism should overcome the
26 rural conditions for their dwellers. Without engaging with complexities, technologies
27 may not solve but rather perpetuate existing issues in the Global South [15–18].
28   Smart city debates tend to be focused on how well technology serves the city
29 toward predetermined goals [19–22]. Much of the corporate literature emphasizes
30 how big data and hardware evolution (the Internet of Things) can contribute to more
31 transparent governance and effective monitoring of city infrastructure and services.
32 In developmental contexts, technology is often seen as an enabler, a positive force that
33 can be harnessed for socioeconomic development. The trouble with much of this
34 interpretation is twofold: (i) There is a tendency to view innovation as a force sitting
35 outside human interaction, knowledge, and experience, driven by experts; (ii) the
36 assumption that the "old" replaces the "new" with the broadened availability of
37 technological tools may not come true [23].
38   This chapter argues that a revised perspective that engages with rural dwellers is
39 required. In this regard, the intervention in the Global South initially revealed that
40 socio-technical processes manifest spatially as the relationships between the material
41 (technology, infrastructure, and natural systems) and human agency (social action,
42 planning, and culture) evolve. This represents an interaction between technological
43 innovation and the construction and appropriation of social innovation processes.
44 Moulaert and MacCallum define social innovation as "innovation in social relations
45 based on values of solidarity, reciprocity, and association" [24] (p. 1). The scope of
46 this chapter is how social innovation can help rural communities in the Global South
47 to be emancipated through digital transformations [26, 27].

01 COVID-19 was spreading rapidly, and its tragic aftermath showed that the world is
02 highly interconnected. Acknowledging the particularities of the Global South in rela-
03 tion to the Global North is necessary to solve a great number of problems [28].
04 Shockingly, COVID-19 made all world citizens pandemic citizens, share the same fear,
05 uncertainty, and risks regardless of their location in the world [29–31]. However, it
06 was unlikely that the pandemic crisis and its algorithmic disruptive vulnerabilities
07 equally affected citizens in the Global South and the Global North. It firmly appeared
08 that the pandemic crisis forced the world toward an algorithmic crisis, in which
09 citizens' data could be used for unfair or unethical purposes by governments or
10 private companies. Now, the proliferation of new emerging digitalization/datafication
11 apps, including ChatGPT and Metaverse among others, only demonstrated this early
12 intuition. Above all, and keeping in mind the digital risks, Living Labs are among the
13 various resilience strategies that are worth considering to tackle the aftermath of
14 COVID-19 stemming from social innovation [32–34].
15 Against this backdrop, and alongside the SDGs policy scheme, this chapter eluci-
16 dates a new experimental policy intervention model called SRC. In advent of the smart
17 cities policy mainstream trend in the Global North, this model challenges the three
18 main joint pillars of cities, villages, and citizens [35–41]. SRC is a result of research and
19 policy findings regarding a fieldwork action research project conducted in several
20 rural, vulnerable, and remote communities in the Global South in 2017, namely in the
21 postconflict areas in Colombia (Latin America) and in newly developed and scattered
22 areas in Mozambique (Africa). Insightful data shaped an intervention through this
23 experimental model entitled SRC, based on the qualitative fieldwork action research
24 carried out in 2017.
25 Hence, this chapter intertwingles the state-of-the-art on interrelated concepts,
26 such as smart cities [42], smart villages [22], Living Labs [43], and action research, as
27 well as their impact on the implementation of the SDGs by focusing on (i) the
28 feasibility of technology, (ii) the role of politics and power relations in communities,
29 and (iii) the self-capacity of communities to develop their locally-driven entrepre-
30 neurial model based on (data) co-operativism [44, 45].
31 The point of departure of this chapter is that new technologies or smart technolo-
32 gies coexist with "older" versions, and this relationship is strongly influenced by
33 structural factors [46, 47]. The chapter argues that insights into these digital transfor-
34 mational processes are necessary to guide smart city technology investments and
35 interventions that are meaningful and tailored to the specific contexts that Colombia
36 and Mozambique can afford. After this introduction and literature review that
37 informs this view and presents the main research question, the chapter provides a
38 rationale for the research intervention in the next section by describing the method-
39 ology of the fieldwork action research through Living Labs in Colombia and Mozam-
40 bique. Ultimately, the chapter concludes by revealing policy recommendations in
41 Mozambique and Colombia and exposing the future implications in light of the cur-
42 rent post-COVID-19 context in remote and rural communities in the Global South.
43 Based on the provided research results, there is a growing interest in the use of
44 participatory approaches to develop ICTs for rural farming communities [48]. The
45 enabling rural innovation (ERI) approach is an innovative action research approach
46 that aims to strengthen the social organization and entrepreneurial capacity in rural
47 communities. The approach focuses on fostering community-based capacity for the
48 inclusion of rural women and the poor in analyzing and accessing market opportuni-
49 ties. The use of participatory action research has been found to help the farming
50 community in adopting ICT-based solutions for agriculture, which in turn contributes

3

to solving problems as well as assisting decision-making in identifying technological and agricultural needs.

SRC is a growing area of interest, and there is a need to understand the role of digital technology in rural development [49]. The smart society is a global movement that is highlighted in line with digital technology advances. However, most studies of the smart society focus on the use of technology to aid human activities, especially in urban areas, or simply smart cities. The study on how technology impacts rural communities is still limited. The study found that the rural community was able to access and utilize external resources to provide added value to the community. Moreover, interactions between the rural and urban communities generated ideas through a learning process. One of these ideas was the application of digital technology to solve problems in rural areas. Participatory design methods as action research can be applied to the education of rural individuals in information and communication technology (ICT). PunCar Action is a volunteer program in which ICT educators tour the rural communities of Taiwan, offering courses on the use of digital technology. Participatory design is an excellent way to teach ICT and Web 2.0 skills, cocreate community blogs, and sustain intrinsic motivation to use Web applications. PunCar Action provides an innovative bottom-up intergenerational ICT education model with high penetrability capable of enhancing the confidence of rural residents in the use of ICT.

Smart villages are an increasingly important area of interest for scholars and practitioners, as well as rural areas and communities [50]. Rural areas are significantly affected by the spatial vulnerability, the digital gap, depopulation, and population aging. Marginalized populations are seeking collective well-being, social inclusion, and local development in smart villages. The limited interventions of smart villages in Greece focus on social innovation, entrepreneurship, and the use of ICTs to enhance the quality of life in rural areas. Innovation, knowledge, growth, and management appear to impact rural smart planning.

In conclusion, the use of participatory action research approaches and ICTs can help rural communities in adopting smart solutions for agriculture and rural development. Participatory design methods can be applied to the education of rural individuals in ICT. Smart villages are an increasingly important area of interest for scholars and practitioners, as well as rural areas and communities. Innovation, knowledge, growth, and management appear to impact rural smart planning.

3. Action research fieldwork: Colombia and Mozambique

This section presents the fieldwork action research that was undertaken in rural and remote communities in postconflict areas in Colombia (Latin America) and newly developed areas in Mozambique (Africa). The section thus provides qualitative data to shape an intervention model entitled SRC. By doing so, the project intends not only to revert the Smart-City-Global-North logic in developing countries but also to establish an ad-hoc contextualized version for rural communities in several strategically-targeted locations in the Global South (**Figure 1**).

The project was led by the NGO Ayuda En Acción (aid-in-action), based in Spain, which employed and deployed the resulting strategic outcomes internationally among their territorial development areas and branches. Despite the fact that the NGO has been operating internationally with a vision characterized by action-driven international aid, this project enhanced the potential strategy of the NGO by adapting the

Figure 1.
Mozambique and Colombia fieldwork action research: Smart rural communities (2017).

01 "smart" use of ICT, energy, mobility, education, health, gender, and governance
02 advancements jointly with a participatory and experimental methodology of Living
03 Labs. The project envisaged an update on the way the NGO Ayuda en Acción operates
04 as an international organization for development and humanitarian aid.
05   The research design consisted of three phases: (i) state-of-the-art, (ii) fieldwork
06 research, and (iii) modelization. The fieldwork research used three action research
07 techniques: (i) visual ethnography, (ii) in-depth interviews, and (iii) Living Labs, in
08 combination with focus groups. This project showed a policy commitment to
09 renewing strategic and operative intervention models of the NGO Ayuda En Acción
10 by including ultimately some lessons learned from the ground for both infrastructure
11 and community capacity building. The project sought strategic alignment with some
12 supranational institutions in this field, such as BID (Inter-American Bank for Devel-
13 opment - Banco Interamericano de Desarrollo), EU, UN-Habitat, and OECD, among
14 others.
15   In the two aforementioned cases, local residents in rural and remote communities
16 directly participated in the action research fieldwork. The project was particularly

01 interested in analyzing their perceptions and how their daily lives could be improved
02 by scaling up from technological mundane advancements. The fieldwork identified
03 groups of stakeholders to examine their mutual inter-dependency in enhancing com-
04 munity empowerment stemming from opportunities provided by smart strategies and
05 cooperative socioeconomic formation from scratch.
06   Two groups of stakeholders were given particular consideration alongside the
07 intervention process: millennials and women. For the first group of stakeholders,
08 particularly in Colombia, it was remarkably challenging that young entrepreneurs
09 were returning from cities to their villages after a long period of being absent from
10 their communities due to the conflict. In Mozambique, the project explored the role
11 and potential engagement of women in agriculture associations run collectively by
12 them. Ultimately, the project aimed to encourage local residents/natives to initiate
13 their own entrepreneurial ideas by being supported by experts and technical profes-
14 sionals. Participants took part in diverse action research activities in their community,
15 reflecting collectively on their present and future living and working conditions over-
16 all. By focusing on these target groups, the SRC project aimed to empower them in the
17 community's collective decision-making processes, thereby enhancing community
18 empowerment stemming from opportunities provided by smart strategies and coop-
19 erative social-economic formation from scratch.
20   Furthermore, this chapter revolves around the SRC as an experimental interven-
21 tion model. It not only aimed to revert the postcolonial smart city rationale imposed
22 from the Global North but also to establish an ad-hoc contextualized version for rural,
23 vulnerable, and remote communities. SRC critically examined the 17 SDGs and the
24 New Urban Agenda-Habitat III coordinated by UNHabitat through the lenses of the
25 two aforementioned experimental action research fieldwork processes.
26   The SRC experimental intervention model was scientifically led since 2016 by the
27 author of this chapter as a senior researcher at the University of Oxford, in close
28 collaboration with the NGO Ayuda en Acción (aid-in-action). Initially, SRC aimed to
29 reformulate the intervention strategy of this NGO by adapting the "smart" use of ICT,
30 energy, mobility, education, health, gender equality, youth and women entrepre-
31 neurship, and governance advancements jointly with a participatory and experimental
32 methodology based on Living Labs. Consequently, this chapter contributes to the
33 reformulation of the way NGOs, such as Ayuda En Acción in Spain, operate as
34 international organizations for the development and humanitarian aid by reorienting
35 their strategic focus through an experimental push.
36   The fieldwork action research process focused on local residents in rural, poor,
37 and remote communities, referred to as "rural citizens." The research aimed to
38 understand their perceptions and how their daily lives could be improved by
39 scaling up technological advancements. Through the process of intervention, two
40 groups of stakeholders were given particular consideration and targeted: millennials
41 and women.
42   To achieve its objectives, the project used "Living Labs," a participatory and
43 experimental methodology based on a real-time attempt to experiment with what
44 rural living labs should mean in this specific project. The Living Labs approach
45 allowed for the identification of groups of stakeholders and examination of their
46 mutual interdependencies and communities' path-dependencies, enhancing the
47 community's overall capacity for empowerment. Living Labs are collaborative envi-
48 ronments where researchers, industry, government, and communities work together
49 to cocreate prototype and test innovative solutions to societal challenges. These labs
50 serve as real-world testing grounds that allow researchers to gain insight into the

01 needs and behavior of users while providing communities with access to new tech-
02 nologies and services that can improve their quality of life.
03   In the context of rural and remote communities in Mozambique and Colombia, Living
04 Labs have been established to address specific challenges faced by these communities,
05 such as limited access to healthcare, education, and transportation. These Living Labs
06 focus on developing solutions that are locally relevant, sustainable, and scalable.
07   In Mozambique, Living Labs have been established in the provinces of Inhambane
08 and Cabo Delgado to address challenges related to healthcare and education. The
09 Living Lab in Inhambane focuses on improving maternal and child healthcare by
10 providing access to telemedicine services and developing locally relevant health tech-
11 nologies. The Living Lab in Cabo Delgado focuses on improving access to education
12 through the use of technology, such as e-learning platforms and mobile apps.
13   In Colombia, Living Labs have been established in rural and remote areas to
14 address challenges related to transportation, energy, and agriculture. For example, the
15 Living Lab in Guajira focuses on developing sustainable energy solutions, such as solar
16 panels and wind turbines, to address the region's limited access to electricity. The
17 Living Lab in Cauca focuses on improving agricultural productivity through the use of
18 precision farming technologies.
19   Overall, Living Labs in rural and remote communities in Mozambique and Colom-
20 bia serve as important platforms for promoting innovation and sustainable develop-
21 ment, while improving the lives of local communities.
22   Through diverse research activities, including visual ethnography, in-depth inter-
23 views, and focus groups, participants reflected collectively on their present and future
24 living and working conditions. This enabled them to initiate their own entrepreneurial
25 ideas by being supported by experts and technical professionals in the fields of energy,
26 entrepreneurship, and education.
27   In conclusion, the SRC project aimed to establish an ad-hoc contextualized version
28 of the smart city concept for rural communities in several strategically targeted loca-
29 tions of the Global South. By adopting smart use of ICT, energy, mobility, education,
30 health, gender equality, youth and women entrepreneurship, and governance
31 advancements jointly with a participatory and experimental methodology, the project
32 aimed to enhance the potential strategy of the NGO Ayuda En Acción. Through its
33 fieldwork action research process, the project sought to empower local communities,
34 with a particular focus on millennials and women, thereby promoting community
35 empowerment and sustainable development.
36   Action research is a problem-solving approach that combines research, action, and
37 reflection to identify and address practical problems in real-world contexts. This
38 approach was particularly useful for projects such as SRC that aimed to overcome
39 barriers to sustainable development in rural areas. Here are some ways that action
40 research aided to overcome barriers in the SRC project:

41   1. Identifying barriers: Action research helped to identify the specific barriers that
42   are preventing rural communities from adopting new technologies and practices.
43   This included barriers related to access, affordability, or cultural norms.

44   2. Co-creation: Action research involved collaboration between researchers,
45   community members, and other stakeholders to co-create solutions that were
46   tailored to the specific needs of the community. This approach helped to
47   overcome barriers by ensuring that solutions are relevant, acceptable, and
48   feasible for the community.

3. Testing and refinement: Action research involved testing and refining solutions in real-world settings to ensure that they are effective and sustainable. This helped to overcome barriers by identifying any implementation challenges and addressing them in a timely manner.

4. Scaling up: Action research helped to identify strategies for scaling up successful solutions to other communities or regions. This helped to overcome barriers by demonstrating the potential impact of the solution and encouraging wider adoption.

In the context of SRC, action research helped to overcome barriers to sustainable development by identifying and addressing the specific challenges faced by rural communities, co-creating solutions that are tailored to their needs, testing and refining these solutions in real-world settings, and scaling up successful solutions to other communities or regions.

4. Discussion: findings and policy recommendations for living labs in SRC

Given that action research is a research approach that involves actively working with a community or organization to identify and solve problems, it is a collaborative and iterative process that involves cycles of planning, action, observation, and reflection. In the context of SRC, action research was used to help identify the unique challenges and opportunities facing these communities and to develop and implement solutions that are tailored to their specific needs. For example, action research was used to develop strategies for improving access to high-speed internet, promoting economic development, or addressing environmental concerns. One of the key benefits of action research is that it involves the active participation of community members, which helps to ensure that the solutions developed are relevant and effective. Additionally, the iterative nature of the process allows for ongoing feedback and adjustment, which can help to improve the outcomes of the research and implementation efforts. Overall, action research can be a powerful tool for helping to create smarter, more resilient, and more sustainable rural communities.

This action research fieldwork attempts three goals:

i. To address existing problems in rural areas by empowering people to take the lead in finding solutions. This involves creating new opportunities and leveraging the capabilities of the entire community, with a particular emphasis on engaging young people and women.

ii. Through investment in infrastructure, technology, and education to ensure access to basic services such as energy, water, sanitation, connectivity, and housing, while also creating entrepreneurial ecosystems that not only help manage these services but also promote economic and social development in the community.

iii. In this sense, the main goal was not only to reduce the gap between rural and urban areas but also to generate a "wave" of progress that would ensure a constant improvement of rural spaces based on their own expectations,

involving the majority of their social capital and ensuring the sustainability of the environment.

Particularly, the SRC action research fieldwork focused on:

i. Four sectors: energy, production, education, and connectivity.

ii. It aimed at finding interdependencies through solar panels, internet connection, and mobile phones.

iii. The analysis of the experts started in the habitus of rural dwellers rather than in the existing software.

iv. A transdisciplinary team of experts works with rural dwellers through the analysis in Living Labs.

v. Visual ethnography, interviews, and group dynamics unpacked the site context as well as providing a way to visualize collectively a decision-making process.

vi. Rural dwellers were empowered through this process, and it suggested that the local team of experts could probably manage to keep the dynamic alive after the kick-off session.

vii. Rural dwellers were surprised by the way in which dynamics took place.

viii. In both cases, it suggested that this dynamic could remain as a Living Lab.

Thus, the SRC framework was deployed as Living Lab aiming two general aims:

1. Improving the community "hardware":

   a. The goal was to achieve an integrated rural environment in global development processes, taking advantage of its territorial attributes, through the provision of appropriate technology, infrastructure, and services to address identified deficiencies and reduce gaps.

   b. Action research style: In order to improve community hardware, an action research approach was employed to identify specific technological and infrastructural needs of the rural environment. Through collaboration with local communities and stakeholders, the project worked to design and implement solutions that are tailored to their unique needs and circumstances.

2. Programming the necessary "software" and its successive iterations:

   a. The aim was to design and facilitate processes that will allow this hardware to fulfill its intended function, be sustainable, and be leveraged for the general benefit in the long term. It is about ensuring social innovation associated with assets and technology, which allowed for new forms of

01 management, administration, execution, new instruments or tools, and
02 new combinations of factors aimed at improving social conditions.

03 b. Action research style: In order to ensure the effectiveness and
04 sustainability of the software, an action research approach was employed
05 to continuously assess and improve its functionality based on the needs and
06 expectations of the community and environment. Through ongoing
07 collaboration with local communities and stakeholders, the project worked
08 to design and implement updates that are responsive to their changing
09 needs and circumstances. Additionally, the software was developed
10 through prototyping in real-time with the community in Living Labs, as
11 simulated during fieldwork.

12 Nonetheless, given that action research is a process that could be designed in
13 different manner to result in diverse outcomes, the interventions in Colombia and
14 Mozambique considerably differed due to the SWOT analysis that this chapter pre-
15 sents as follows (**Tables 1** and **2**):
16 Thus SRC resulted in eight policy recommendations:

17 1. Systemic sustainability: This involves a commitment to sustainability in its triple
18 dimension: economic, social, and environmental. Sustainable and collaborative

External	THREATS	OPPORTUNITIES
	• Rural citizens had very little knowledge of other communities (which made SRC even more necessary). • There was an infinite distance (perhaps indifference?) between the institutional world and reality: one could not rely on government officials. • They could even be hesitant about SRC, for fear of losing control.	• There was a great variety and potential in the communities. • In all three communities, the younger generation showed a lot of enthusiasm to get involved and even to lead the transformation. • There was great potential in mobile telephones due to its rapid penetration. • A small assembly could produce a very strong and positive catalytic effect: it was necessary to delegate to persistent individuals.
Internal	WEAKNESSES	STRENGTHS
	• Hardware experts were accustomed to working in silos, in their own expertise (this is normal). • Grassroots organizations (CDS and Semana Foundation) had very different approaches and unequal involvements toward SRC.	• Internal leadership with a lot of vision and freedom of action. • Operational manager with great relational capacity and facilitation skills. • Hardware team members: although they had a lot of uncertainty and resistance at the beginning, after contacting the communities during the fieldwork, they showed great potential for assembly. Another week had been needed to model the specifics. • Good logistical organization of the internal team (software).

Bolivar (COLOMBIA). Cabo Delgado (MOZAMBIQUE).

Table 1.
SWOT analysis: Bolivar (Colombia) and Cabo Delgado (Mozambique).

External	THREATS	OPPORTUNITIES
	• There was a great dispersion of communities: This did not facilitate an orderly dynamic with technical or territorial criteria. • The institutional world was very far from reality and did not have any clear vision of the necessary prioritization. They did not see the potential for endogenous community development through "Living Labs."	• There was no single vector of development, which could be a potential, combined with the fact that some people from different communities had a very fruitful dialog beyond observing the development of their own community. • There was a great diversity of options for development. It seemed that there was an imposed hierarchy (men with political rank and weight), which did not convince several people with the capacity for transformation. • Education was clearly a need linked to production and entrepreneurship. The issue of connectivity was discovered almost by accident (it could be thought that it will be the triggering factor).
Internal	WEAKNESSES	STRENGTHS
	• Grassroots organization (Muleide), with good intentions, but with a paternalistic bias typical of organizations in the area. However, with appropriate accompaniment, it could have been corrected and even had interesting results.	• Internal/software team completely integrated and knowledgeable about the field: open to learning and experimenting. • A work plan could have been developed for the aforementioned communities from the moment the fieldwork had been completed.

Table 2.
SWOT analysis: Bolivar (Colombia) and Cabo Delgado (Mozambique).

territories consider "competitiveness" not only in terms of private or sectoral competitiveness but also the competitiveness of all actors and sectors in the territory.

2. Social cohesion: The ultimate goal should be to improve the quality of life for all inhabitants of the territory with concrete actions on gender, childhood, youth, and indigenous populations that fight against exclusion, poverty, and inequality and ensure the safeguarding of human rights.

3. Territorial planning: It is necessary to contribute to ecologically sustainable, spatially harmonious, and socially fair human development by organizing the use, exploitation, and occupation of the territory, taking into account the needs of the population and the recommendations generated by all planning and management instruments.

4. Rural entrepreneurship: This is an important component for addressing the economic problems of rural communities, especially for young people. It involves promoting technological, organizational, and management innovations, based on the idea of "accompaniment ecosystems" designed to generate new productive and employment opportunities.

5. Rural innovation: Sustainability depends on the ability to innovate, integrate existing knowledge in the territory, and connect and use it for the common

Long-Term Impact	Mid-Term Impact	Objectives	Results	LEVERS
Reduce the development gap in rural areas through the use of information and knowledge exchange.	Create a sustainable living environment that enables access to personal and professional development opportunities.	Social Development	Improved access to sources of energy.	Low-voltage renewable energy network enabling household service
			Improved access to water and sanitation.	Potable water system using energy
			Improved health care services.	Provision and/or improvement of healthcare services using energy
			Improved quality education services.	Provision and/or improvement of education services using energy
		Economic Development	Job creation.	Training program for green economy employment
			Improved employability skills.	Technical training for the provision of basic services
			Increased entrepreneurship.	Training and advisory plans for entrepreneurs
			Promotion of value chains.	Training, business plan advisory, and infrastructure provision
		Environmental Development	Ensured waste management and reuse.	Design and implementation of a circular economy-based solid waste management system in the community
			Generated environmental risk management system.	Training and implementation of a risk management system that includes early warning
			Implemented monitoring and tracking system for natural resources.	Community organization and training to measure and record the evolution of natural resources
			Utilized environmental potential.	Study to determine possibilities for carrying out payment for environmental services projects

Long-Term Impact	Mid-Term Impact	Objectives	Results	LEVERS
		Community Development	Strengthened organizational structure.	Construction of an associative fabric that supports the management of different services/enterprises
			Generated participation channels.	Permanent consultation system taking advantage of technology.
			Increased knowledge of the needs and behavior of the population.	Design and use of a data platform that allows for the accumulation and analysis of population behaviors and the conclusions of participation processes.
			Reduced connectivity gap.	Installation of a home-use and production-unit internet connection system.
		Process	It is necessary to consider the initial elements of the project, which should start with high participation and a study that orders the territory and detects its needs/potential.	Territorial planning
				Participation, listening, and co-creation
				Pilot system

Table 3.
SRC living lab model of intervention driven by action research.

01 benefit. It requires continuous learning and adaptation, collaboration and
02 networking, and handling a large volume of information.

03 6. Climate change resilience: It is recognized that response mechanisms to the
04 impacts of climate change must be planned and executed in a coordinated
05 manner from different levels of government and communities, and must be
06 considered in any public action in the territory.

07 7. Rural–urban balance: It is proposed to establish synergies between rural and
08 urban territories and to stop considering them as autonomous sectors. The aim
09 would be to replace this separation with a new shared territorial network that
10 would allow the common challenge of building sustainable, collaborative, and
11 interconnected territories to be addressed.

12 8. Governance: In intelligent, sustainable, collaborative, and inclusive territories,
13 new forms of governance are created to ensure that decision-making is
14 participatory and informed. Through codecision mechanisms, it is possible to
15 unite wills around shared projects, beyond mere representation, which are
16 informed and evaluated by the entire community.

17 The following table presents the resulting SRC Living Lab model of intervention
18 driven by action research. The table consists of long-term and mid-term impacts, four
19 objectives, sixteen results, and levers. In addition, a process is defined as a template
20 (**Table 3**).

5. Conclusions

22 To sum up, the chapter concludes with policy implications as a result of the SRC
23 action research fieldwork in Mozambique and Colombia. The fieldwork action
24 research through both Living Labs resulted in several conclusions that could be lever-
25 aged through SRC approach:
26 In Bolivar, Colombia, the following ideas have the potential to be implemented,
27 depending on the specific contextual conditions:

28 1. Develop and implement smart tourism initiatives that can help to promote and
29 preserve Colombia's natural and cultural heritage, while also generating
30 economic opportunities for rural communities.

31 2. Promote sustainable forestry practices and the development of bioeconomy
32 initiatives that can help to diversify and strengthen the rural economy.

33 3. Expand access to high-speed internet and digital infrastructure in rural areas, in
34 order to support the development of e-commerce, e-learning, and other digital
35 services.

36 4. Develop and implement smart waste management systems that can help to
37 reduce environmental pollution and improve the health and well-being of rural
38 communities.

5. Foster social innovation and entrepreneurship in rural areas by providing access to training, financing, and support for community-driven initiatives that address local challenges and create economic opportunities.

In Cabo Delgado, Mozambique, the following ideas have the potential to be implemented, depending on the specific contextual conditions:

1. Develop and implement innovative and sustainable agricultural practices that are tailored to the specific needs and challenges of rural communities in Mozambique, such as drought-resistant crops and precision agriculture.

2. Expand access to renewable energy sources, such as solar and wind power, to improve the energy security and economic opportunities of rural communities.

3. Develop and implement smart water management systems that can help rural communities to better conserve and manage their water resources, especially during times of drought.

4. Establish community telecenters and other digital infrastructure to provide access to information and communication technologies (ICTs) and support the development of digital skills and entrepreneurship in rural areas.

5. Develop and implement smart transportation systems that can improve the mobility and connectivity of rural communities, such as the use of electric vehicles and shared mobility solutions.

In summary, the SRC approach through Living Labs interventions by employing action research fieldwork shows a high and positive impact in rural and remote communities in Colombia and Mozambique. Overall, the policy implications drawn from the SRC action research fieldwork in Mozambique and Colombia suggest that investing in sustainable and innovative initiatives tailored to the specific needs and challenges of rural communities can lead to positive outcomes for both the environment and local economies. The Living Labs interventions, which utilized an action research approach, demonstrated the potential for such initiatives to have a significant impact in remote and rural areas.

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Conflict of interest

The author declares no conflict of interest.

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