<table>
<thead>
<tr>
<th>[AQ01]</th>
<th>Please confirm the citation of Figure 1 inserted in the text.</th>
</tr>
</thead>
<tbody>
<tr>
<td>[AQ02]</td>
<td>Please confirm the citation of Tables 1-3 inserted in the text.</td>
</tr>
<tr>
<td>[AQ03]</td>
<td>Citations for references Reference [25] was are missing. Please provide the citations or delete the references from the list.</td>
</tr>
<tr>
<td>[AQ04]</td>
<td>Please provide the publisher location for references [9, 43].</td>
</tr>
<tr>
<td>[AQ05]</td>
<td>References [22] and [43] were identical. Hence the later has been deleted and the subsequent references have been renumbered for sequential order both in text and list. Please check and confirm.</td>
</tr>
<tr>
<td>[AQ06]</td>
<td>Please provide the volume, page range for reference [31].</td>
</tr>
<tr>
<td>[AQ07]</td>
<td>Please provide the publisher name, publisher location for reference [32].</td>
</tr>
<tr>
<td>[AQ08]</td>
<td>Please provide the volume for references [44, 47].</td>
</tr>
</tbody>
</table>
Chapter 2

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 Cooperative 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.
The fieldwork action research was conducted between June and August 2017 in two locations in the Global South to explore the potential technological empowerment among rural dwellers living in vulnerable communities and remote settlements [1–4]. Specifically, this chapter examines and compares a postconflict area located in Bolivar, Colombia (Latin America) and a newly developed and scattered area located in Pemba, Mozambique (Africa). Through an insightful intervention, the author shapes this experimental model entitled SRC based on qualitative fieldwork action research [5].

Furthermore, this chapter revolving around SRC as an experimental intervention model for international cooperation is feasible by experimenting through Living Labs with SDGs in the Global South. This research question was presented and discussed in the Summer School Smart Rural Communities that took place on 12–13 September 2019 in San Sebastián, Basque Country, Spain (https://www.uik.eus/es/node/5812/pdf). This would enable digital transformational processes to be implemented as grassroots innovation in collaboration with remote and rural communities dwellers.

2. Literature review: from smart cities to SRC

In the Global North, corporate smart-city rhetoric portrays technology as a catch-all solution for social, economic, and environmental urban issues [9–14]. A politicized point of departure encourages tabula-rasa interventions and replaces as hegemonic the normative rationale behind the notion that smart urbanism should overcome the rural conditions for their dwellers. Without engaging with complexities, technologies may not solve but rather perpetuate existing issues in the Global South [15–18].

Smart city debates tend to be focused on how well technology serves the city toward predetermined goals [19–22]. Much of the corporate literature emphasizes how big data and hardware evolution (the Internet of Things) can contribute to more transparent governance and effective monitoring of city infrastructure and services. In developmental contexts, technology is often seen as an enabler, a positive force that can be harnessed for socioeconomic development. The trouble with much of this interpretation is twofold: (i) There is a tendency to view innovation as a force sitting outside human interaction, knowledge, and experience, driven by experts; (ii) the assumption that the “old” replaces the “new” with the broadened availability of technological tools may not come true [23].

This chapter argues that a revised perspective that engages with rural dwellers is required. In this regard, the intervention in the Global South initially revealed that socio-technical processes manifest spatially as the relationships between the material (technology, infrastructure, and natural systems) and human agency (social action, planning, and culture) evolve. This represents an interaction between technological innovation and the construction and appropriation of social innovation processes. Moulaert and MacCallum define social innovation as “innovation in social relations based on values of solidarity, reciprocity, and association” [24] (p. 1). The scope of this chapter is how social innovation can help rural communities in the Global South to be emancipated through digital transformations [26, 27].
COVID-19 was spreading rapidly, and its tragic aftermath showed that the world is highly interconnected. Acknowledging the particularities of the Global South in relation to the Global North is necessary to solve a great number of problems [28]. Shockingly, COVID-19 made all world citizens pandemic citizens, share the same fear, uncertainty, and risks regardless of their location in the world [29–31]. However, it was unlikely that the pandemic crisis and its algorithmic disruptive vulnerabilities equally affected citizens in the Global South and the Global North. It firmly appeared that the pandemic crisis forced the world toward an algorithmic crisis, in which citizens’ data could be used for unfair or unethical purposes by governments or private companies. Now, the proliferation of new emerging digitalization/datafication apps, including ChatGPT and Metaverse among others, only demonstrated this early intuition. Above all, and keeping in mind the digital risks, Living Labs are among the various resilience strategies that are worth considering to tackle the aftermath of COVID-19 stemming from social innovation [32–34].

Against this backdrop, and alongside the SDGs policy scheme, this chapter elucidates a new experimental policy intervention model called SRC. In advent of the smart cities policy mainstream trend in the Global North, this model challenges the three main joint pillars of cities, villages, and citizens [35–41]. SRC is a result of research and policy findings regarding a fieldwork action research project conducted in several rural, vulnerable, and remote communities in the Global South in 2017, namely in the postconflict areas in Colombia (Latin America) and in newly developed and scattered areas in Mozambique (Africa). Insightful data shaped an intervention through this experimental model entitled SRC, based on the qualitative fieldwork action research carried out in 2017.

Hence, this chapter intertwines the state-of-the-art on interrelated concepts, such as smart cities [42], smart villages [22], Living Labs [43], and action research, as well as their impact on the implementation of the SDGs by focusing on (i) the feasibility of technology, (ii) the role of politics and power relations in communities, and (iii) the self-capacity of communities to develop their locally-driven entrepreneurial model based on (data) co-operativism [44, 45].

The point of departure of this chapter is that new technologies or smart technologies coexist with “older” versions, and this relationship is strongly influenced by structural factors [46, 47]. The chapter argues that insights into these digital transformational processes are necessary to guide smart city technology investments and interventions that are meaningful and tailored to the specific contexts that Colombia and Mozambique can afford. After this introduction and literature review that informs this view and presents the main research question, the chapter provides a rationale for the research intervention in the next section by describing the methodology of the fieldwork action research through Living Labs in Colombia and Mozambique. Ultimately, the chapter concludes by revealing policy recommendations in Mozambique and Colombia and exposing the future implications in light of the current post-COVID-19 context in remote and rural communities in the Global South.

Based on the provided research results, there is a growing interest in the use of participatory approaches to develop ICTs for rural farming communities [48]. The enabling rural innovation (ERI) approach is an innovative action research approach that aims to strengthen the social organization and entrepreneurial capacity in rural communities. The approach focuses on fostering community-based capacity for the inclusion of rural women and the poor in analyzing and accessing market opportunities. The use of participatory action research has been found to help the farming community in adopting ICT-based solutions for agriculture, which in turn contributes
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
“smart” use of ICT, energy, mobility, education, health, gender, and governance advancements jointly with a participatory and experimental methodology of Living Labs. The project envisaged an update on the way the NGO Ayuda en Acción operates as an international organization for development and humanitarian aid.

The research design consisted of three phases: (i) state-of-the-art, (ii) fieldwork research, and (iii) modelization. The fieldwork research used three action research techniques: (i) visual ethnography, (ii) in-depth interviews, and (iii) Living Labs, in combination with focus groups. This project showed a policy commitment to renewing strategic and operative intervention models of the NGO Ayuda En Acción by including ultimately some lessons learned from the ground for both infrastructure and community capacity building. The project sought strategic alignment with some supranational institutions in this field, such as BID (Inter-American Bank for Development - Banco Interamericano de Desarrollo), EU, UN-Habitat, and OECD, among others.

In the two aforementioned cases, local residents in rural and remote communities directly participated in the action research fieldwork. The project was particularly
interested in analyzing their perceptions and how their daily lives could be improved by scaling up from technological mundane advancements. The fieldwork identified groups of stakeholders to examine their mutual inter-dependency in enhancing community empowerment stemming from opportunities provided by smart strategies and cooperative socioeconomic formation from scratch.

Two groups of stakeholders were given particular consideration alongside the intervention process: millennials and women. For the first group of stakeholders, particularly in Colombia, it was remarkably challenging that young entrepreneurs were returning from cities to their villages after a long period of being absent from their communities due to the conflict. In Mozambique, the project explored the role and potential engagement of women in agriculture associations run collectively by them. Ultimately, the project aimed to encourage local residents/natives to initiate their own entrepreneurial ideas by being supported by experts and technical professionals. Participants took part in diverse action research activities in their community, reflecting collectively on their present and future living and working conditions overall. By focusing on these target groups, the SRC project aimed to empower them in the community’s collective decision-making processes, thereby enhancing community empowerment stemming from opportunities provided by smart strategies and cooperative social-economic formation from scratch.

Furthermore, this chapter revolves around the SRC as an experimental intervention model. It not only aimed to revert the postcolonial smart city rationale imposed from the Global North but also to establish an ad-hoc contextualized version for rural, vulnerable, and remote communities. SRC critically examined the 17 SDGs and the New Urban Agenda-Habitat III coordinated by UNHabitat through the lenses of the two aforementioned experimental action research fieldwork processes.

The SRC experimental intervention model was scientifically led since 2016 by the author of this chapter as a senior researcher at the University of Oxford, in close collaboration with the NGO Ayuda en Acción (aid-in-action). Initially, SRC aimed to reformulate the intervention strategy of this NGO by adapting the “smart” use of ICT, energy, mobility, education, health, gender equality, youth and women entrepreneurship, and governance advancements jointly with a participatory and experimental methodology based on Living Labs. Consequently, this chapter contributes to the reformulation of the way NGOs, such as Ayuda En Acción in Spain, operate as international organizations for the development and humanitarian aid by reorienting their strategic focus through an experimental push.

The fieldwork action research process focused on local residents in rural, poor, and remote communities, referred to as “rural citizens.” The research aimed to understand their perceptions and how their daily lives could be improved by scaling up technological advancements. Through the process of intervention, two groups of stakeholders were given particular consideration and targeted: millennials and women.

To achieve its objectives, the project used “Living Labs,” a participatory and experimental methodology based on a real-time attempt to experiment with what rural living labs should mean in this specific project. The Living Labs approach allowed for the identification of groups of stakeholders and examination of their mutual interdependencies and communities’ path-dependencies, enhancing the community’s overall capacity for empowerment. Living Labs are collaborative environments where researchers, industry, government, and communities work together to cocreate prototype and test innovative solutions to societal challenges. These labs serve as real-world testing grounds that allow researchers to gain insight into the
needs and behavior of users while providing communities with access to new technologies and services that can improve their quality of life.

In the context of rural and remote communities in Mozambique and Colombia, Living Labs have been established to address specific challenges faced by these communities, such as limited access to healthcare, education, and transportation. These Living Labs focus on developing solutions that are locally relevant, sustainable, and scalable.

In Mozambique, Living Labs have been established in the provinces of Inhambane and Cabo Delgado to address challenges related to healthcare and education. The Living Lab in Inhambane focuses on improving maternal and child healthcare by providing access to telemedicine services and developing locally relevant health technologies. The Living Lab in Cabo Delgado focuses on improving access to education through the use of technology, such as e-learning platforms and mobile apps.

In Colombia, Living Labs have been established in rural and remote areas to address challenges related to transportation, energy, and agriculture. For example, the Living Lab in Guajira focuses on developing sustainable energy solutions, such as solar panels and wind turbines, to address the region’s limited access to electricity. The Living Lab in Cauca focuses on improving agricultural productivity through the use of precision farming technologies.

Overall, Living Labs in rural and remote communities in Mozambique and Colombia serve as important platforms for promoting innovation and sustainable development, while improving the lives of local communities.

Through diverse research activities, including visual ethnography, in-depth interviews, and focus groups, participants reflected collectively on their present and future living and working conditions. This enabled them to initiate their own entrepreneurial ideas by being supported by experts and technical professionals in the fields of energy, entrepreneurship, and education.

In conclusion, the SRC project aimed to establish an ad-hoc contextualized version of the smart city concept for rural communities in several strategically targeted locations of the Global South. By adopting smart use of ICT, energy, mobility, education, health, gender equality, youth and women entrepreneurship, and governance advancements jointly with a participatory and experimental methodology, the project aimed to enhance the potential strategy of the NGO Ayuda En Acción. Through its fieldwork action research process, the project sought to empower local communities, with a particular focus on millennials and women, thereby promoting community empowerment and sustainable development.

Action research is a problem-solving approach that combines research, action, and reflection to identify and address practical problems in real-world contexts. This approach was particularly useful for projects such as SRC that aimed to overcome barriers to sustainable development in rural areas. Here are some ways that action research aided to overcome barriers in the SRC project:

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

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

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.

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

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

Nonetheless, given that action research is a process that could be designed in different manner to result in diverse outcomes, the interventions in Colombia and Mozambique considerably differed due to the SWOT analysis that this chapter presents as follows (Tables 1 and 2):

Thus SRC resulted in eight policy recommendations:

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

<table>
<thead>
<tr>
<th>External</th>
<th>THREATS</th>
<th>OPPORTUNITIES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Rural citizens had very little knowledge of other communities (which made SRC even more necessary).</td>
<td>• There was a great variety and potential in the communities.</td>
</tr>
<tr>
<td></td>
<td>• There was an infinite distance (perhaps indifference?) between the institutional world and reality: one could not rely on government officials.</td>
<td>• In all three communities, the younger generation showed a lot of enthusiasm to get involved and even to lead the transformation.</td>
</tr>
<tr>
<td></td>
<td>• They could even be hesitant about SRC, for fear of losing control.</td>
<td>• There was great potential in mobile telephones due to its rapid penetration.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• A small assembly could produce a very strong and positive catalytic effect; it was necessary to delegate to persistent individuals.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Internal</th>
<th>WEAKNESSES</th>
<th>STRENGTHS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Hardware experts were accustomed to working in silos, in their own expertise (this is normal).</td>
<td>• Internal leadership with a lot of vision and freedom of action.</td>
</tr>
<tr>
<td></td>
<td>• Grassroots organizations (CDS and Semana Foundation) had very different approaches and unequal involvements toward SRC.</td>
<td>• Operational manager with great relational capacity and facilitation skills.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• 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.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Good logistical organization of the internal team (software).</td>
</tr>
</tbody>
</table>

Table 1.
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
<table>
<thead>
<tr>
<th>Long-Term Impact</th>
<th>Mid-Term Impact</th>
<th>Objectives</th>
<th>Results</th>
<th>LEVERS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Reduce the development gap in rural areas through the use of information and knowledge exchange.</td>
<td>Create a sustainable living environment that enables access to personal and professional development opportunities.</td>
<td>Social Development</td>
<td>Improved access to sources of energy.</td>
<td>Low-voltage renewable energy network enabling household service</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Improved access to water and sanitation.</td>
<td>Potable water system using energy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Improved health care services.</td>
<td>Provision and/or improvement of healthcare services using energy</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Improved quality education services.</td>
<td>Provision and/or improvement of education services using energy</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Economic Development</td>
<td>Job creation.</td>
<td>Training program for green economy employment</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Improved employability skills.</td>
<td>Technical training for the provision of basic services</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Increased entrepreneurship.</td>
<td>Training and advisory plans for entrepreneurs</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Promotion of value chains.</td>
<td>Training, business plan advisory, and infrastructure provision</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Environmental Development</td>
<td>Ensured waste management and reuse.</td>
<td>Design and implementation of a circular economy-based solid waste management system in the community</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Generated environmental risk management system.</td>
<td>Training and implementation of a risk management system that includes early warning</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Implemented monitoring and tracking system for natural resources.</td>
<td>Community organization and training to measure and record the evolution of natural resources</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Utilized environmental potential.</td>
<td>Study to determine possibilities for carrying out payment for environmental services projects</td>
</tr>
<tr>
<td>Long-Term Impact</td>
<td>Mid-Term Impact</td>
<td>Objectives</td>
<td>Results</td>
<td>LEVERS</td>
</tr>
<tr>
<td>-------------------</td>
<td>-------------------</td>
<td>-------------------------------------</td>
<td>------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Community</td>
<td>Development</td>
<td>Strengthened organizational structure.</td>
<td>Construction of an associative fabric that supports the management of different services/enterprises</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Generated participation channels.</td>
<td>Permanent consultation system taking advantage of technology.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Increased knowledge of the needs and behavior of the population.</td>
<td>Design and use of a data platform that allows for the accumulation and analysis of population behaviors and the conclusions of participation processes.</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Reduced connectivity gap.</td>
<td>Installation of a home-use and production-unit internet connection system.</td>
<td></td>
</tr>
<tr>
<td>Process</td>
<td></td>
<td>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.</td>
<td>Territorial planning, Participation, listening, and co-creation, Pilot system</td>
<td></td>
</tr>
</tbody>
</table>

Table 3.
SRC living lab model of intervention driven by action research.
benefit. It requires continuous learning and adaptation, collaboration and networking, and handling a large volume of information.

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

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

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

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

5. Conclusions

To sum up, the chapter concludes with policy implications as a result of the SRC action research fieldwork in Mozambique and Colombia. The fieldwork action research through both Living Labs resulted in several conclusions that could be lever-aged through SRC approach:

In Bolivar, Colombia, the following ideas have the potential to be implemented, depending on the specific contextual conditions:

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

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

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

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

Acknowledgements

This research was funded by (i) The Learned Society of Wales (LSW) under Grant
524205; (ii) Fulbright Scholar-In-Residence (S-I-R) Award 2022-2023, Grant Number
PS00334379 by US-UK Fulbright Commission and IIE, U.S. Department of State in
California State University, Bakersfield, (iii) the Economic and Social Research Coun-
cil (ESRC) under Grant ES/S012435/1 ‘WISERD Civil Society: Changing Perspectives
on Civic Stratification/Repair’, (iv) Presidency of the Basque Government, External
Affairs General Secretary, Basque Communities Abroad Direction, (v) the Economic
and Social Research Council (ESRC) under Grant ES/M010996/1 ‘Urban Transforma-
tions’, and (vi) Ayuda En Acción, Smart Rural Communities.

The author would like to acknowledge the collaboration with the NGO Ayuda En
Acción. The author is particularly grateful for the work in cooperation with Mr.
Fernando Mudarra and Mr. Iban Askasibar, CEO and alliances director of the NGO, Ayuda En Acción. They took the leadership of this SRC project during the period 2016-2019 culminating with the Summer School in 2019, St Sebastian, Basque Country (Spain). Equally in debt with the great rural dwellers that took the responsibility of the action research fieldwork in Colombia and Mozambique. Obrigado to Josino Eugenio, the teacher at Pemba (Mozambique) for believing that kids’ minds are the strongest technological weapons for the educational revolution.

Conflict of interest

The author declares no conflict of interest.

Author details

Igor Calzada
Cardiff University, Cardiff, UK

*Address all correspondence to: calzadai@cardiff.ac.uk

IntechOpen

© 2023 The Author(s). Licensee IntechOpen. This chapter is distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/3.0), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited.
References


[17] Karvonen A, Cugurullo F, Caprotti F. Inside Smart Cities: Place, Politics and...
Urban Innovation. London: Routledge; 2018


[22] Visvizi A, Lytras M. It’s not a fad: Smart cities and smart villages research in European and global contexts. Sustainability. 2018;10(8):2727


[31] Calzada I. Will Covid-19 be the end of the global citizen? Apolitical. 2020. DOI: 10.13140/RG.2.2.11942.27208/1


[33] von Wirth T, Fuenfschilling L, Frantzeskaki N, Coenen L. Impacts of urban living labs on sustainability transitions: Mechanisms and strategies

[34] Zavratnik V, Superina A, Stojmenova Duh E. Living labs for rural areas: Contextualization of living lab frameworks, concepts and practices. Sustainability. 2019;11(14):3797


