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ICT-based Social Innovation in Africa: the case of Rwanda

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Master of Science in International Development Studies

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Declaration

I, (Aimilia Tikoudi), declare that this thesis is a result of my research investigations and findings. Sources of information other than my own have been acknowledged and a reference list has been appended. This work has not been previously submitted to any other university for award of any type of academic degree.

Signature:

Date:

Acknowledgements

Completing this master's thesis was a true rollercoaster, full of unexpected changes, and adaptations. The journey was challenging but truly intriguing.

If I had to list down the name of each person that supported me along the way, that would deserve another master's thesis. I could not be more grateful for the practical and emotional help they offered.

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Abstract

Information and Communication Technology (ICT) in Sub-Saharan Africa has raised attention for its potential to foster multidimensional development. The rationale for ‘ICT for Development’ (ICT4D) revolves around Africa’s prospects to leapfrog to the digital economy amidst the 4th Industrial Revolution. This thesis reflects on the tech-based initiatives stemming from the African continent through the lens of “Social Innovation”. In other words, ICT-based applications whose primary goal is to tackle social challenges. Related tech products and services are seen as a ‘disruptive’ vehicle to address Africa’s need for ‘Homegrown Solutions’ to regional problems. They are context-specific and tailor-made to local realities.

The conditions that foster the creation of impact-driven ICT innovation vary widely among African countries. The continent illustrates diverse ‘innovation ecosystems’ and ‘innovation cultures’. Nevertheless, there is a knowledge gap on how social innovation can be deliberately planned at large scale, and thus on how it translates into a practical formal strategy in contemporary African societies.

This study examines Rwanda as a distinct case of African ICT-Based social innovation, that effectively manages to plan ICT-based Social Innovation as a state-led, formal practice. Embarking from the devastating 1994 genocide, Rwanda placed ICT at the forefront and formed a global “success story” of recovery and redevelopment. Presently, ICT Innovation is a cross-cutting force in Rwanda’s development agenda, serving the country’s complex socio-cultural context and macroeconomic particularities. Therefore, social innovation is policy-oriented and serves a long-term vision.

The study investigates Rwanda’s approaches to reinforce ICT-based social innovation, by creating a conducive social innovation ecosystem and an innovation culture. It reviews strategies and practical initiatives that Rwanda employs for public mobilization and capacity-building and maps the conditions that enable social innovation to grow in Rwanda. The research conducted a preparatory document review of policies and strategies to outline Rwanda’s key priorities in ICT Innovation and ICT4D. Sequentially, the data collection used in-depth, semi-structured interviews with key informants in Rwanda.

The thesis is exploratory and aims to identify key areas for further investigation. Results showed that the government’s openness to innovation and experimentation create a sense of shared purpose for innovation actors. The government designs tailor-made programs and campaigns directed to both users and innovators and establishes flagship regional initiatives that combine local and global approaches. Social innovation is enabled by a wide range of factors, notably sociocultural features, strong political will, the conducive business climate, Rwanda’s tech-based and market-driven development model, and Rwanda’s regional role as an ICT Hub in Africa. Perhaps more strikingly, visionary leadership and political championship enable the incremental growth of innovation. Rwanda’s social innovation ecosystem is supportive, synergetic and provides diversified opportunities for capacity-building and growth, whilst the innovation culture integrates cultural and traditional values in entrepreneurial ventures. Nevertheless, social innovation is a work in progress with challenges concerning finance, human resources, or adoption. Rwanda’s strategies are no fixed-recipe but bring intriguing implications on how customized planning instruments can shape the conditions for social innovation to emerge.

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List of Abbreviations

Information & Communication Technology	ICT
ICT for Development	ICT4D
The Government of Rwanda	GoR
Smart Rwanda 2020 Master Plan	SRMP
ICT Sector Strategic Plan (2018-2024)	ICT-SSP
ICT Hub Strategy	ICT-HS
Research and Development	R&D
Science, Technology & Innovation	STI
Science, Technology and Innovation Policy	STIP
Ministry of ICT and Innovation of Rwanda	MINICT
Ministry of Information Technology and Communications of Rwanda	MITEC
Ministry of Youth and ICT of Rwanda	MYICT
Rwanda Development Board	RDB
Non-Governmental Organization	NGO
International Non-Governmental Organization	INGO
Entrepreneurship Support Organization	ESO
Small and Medium-Sized Enterprises	SMEs
Private Sector Foundation	PSF
Kigali Innovation City	KIC
Private Public Partnerships	PPP`

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CHAPTER 1: INTRODUCTION

The penetration and diffusion of Information & Communication Technologies (ICTs) in sub-Saharan Africa (SSA) has sparked research attention to its potential for the continent's socioeconomic development. Chiefly, this is captured through 'ICT for Development' (ICT4D) initiatives (Fouche et al., 2022; Krauss, 2022; Khene & Masiero, 2022). The ICT4D discourse looks into SSA's road to the fourth industrial revolution by leapfrogging to the digital economy, i.e. surpassing the traditional industrialization phase (Friederici et al., 2020; Umukoro, 2021). ICT assets are praised for their potential to create social impact. Yet, recent public consideration focuses on "disruptive technologies" stemming from the continents' communities by inventing novel technological applications (Fu, 2020; Shava, 2022).

Beyond the conventional ICT4D approach that emphasizes technological integration and adoption, there is a need to focus on the problem-solving capacity of actors that generate breakthrough technological innovation to address social challenges. Accordingly, this thesis regards these tech-driven solutions through the lens of "Social Innovation". In this thesis, social innovation refers to "*ICT-based Innovation whose primary goal is to tackle social challenges.*"

Social Innovation embraces a pan-African idea to encounter homegrown solutions to regional problems, that are suitable to the local context (Adelle et al., 2018; Gupta & Karam, 2019; Němečková, 2021). African countries present distinct innovation cultures and social innovation ecosystems (Fu, 2020). Areas like Kenya or Nigeria illustrate a scene of emerging tech hubs and bottom-up, youth-oriented, often frugal innovation trends serving short-term, immediate needs. Mobile money, drones-based healthcare, crisis management apps, or solar-energy-charged phones are some examples.

Although there is a global push to enhance ICTs-led social innovation, the conditions that enable social innovation to grow are multidimensional (Ravazzoli & Valero, 2020). Scholars underline that social innovation is not always deliberate and cannot happen in a vacuum (Avelino et al., 2020; Peterson et al., 2020). Nevertheless, little is known about how social innovation can be purposively planned at a large scale, and how state policy and high-level practices can shape the contextual conditions that would support social innovation to grow (Pinto et al., 2021; Ozdemir & Gupta, 2021; Sadabadi & Rahimi Rad, 2022).

An exceptional case is Rwanda, that manages to plan social innovation as a formal state-led strategy. While known for the horrific genocide of 1994, Rwanda has undergone a transformation, largely based on utilizing technology is a central engine for multidimensional development, in hand with a market-driven economy. The country endeavors to become a knowledge-based society, by creating an enabling environment for citizens to devise tech-based solutions (Ciešlik, 2022; McNamee, 2021). ICT emerges as a cross-cutting force to address complex socioeconomic challenges, that will potentially position Rwanda as a leading ICT Hub in Africa (Ntakirutimana et al., 2019; Baguma & Finkelievich, 2021). Hence, social Innovation is policy-oriented and serves a long-term vision.

Rwanda's path brings intriguing implications to social innovation's planning and implementation. This thesis will look at Rwanda's high-level approaches to create a social innovation ecosystem and an innovation culture and examines the underlying conditions that accelerate social innovation's growth.

Research Questions & Study Objectives

STUDY OBJECTIVES:

- To identify practical strategies and large-scale initiatives that can be employed to deliberately reinforce social innovation in an African country.
- To explore the underlying conditions that affect how social innovation grows effectively in African countries.
- To understand what constraining factors affect social innovation's potential to flourish in an African context.

RESEARCH QUESTIONS:

To achieve the above objectives, the study employs a qualitative case study methodology, and selects the case of Rwanda as an African country that promotes social innovation with a practical formal strategy. The study aims to answer the following questions, that will inform our understanding on other African countries:

How does Rwanda successfully develop an ICT-led social innovation ecosystem and an innovation culture?

- 1. What are Rwanda's overarching practical strategies, and initiatives to strengthen ICT-led social innovation, in terms of public mobilization and human capacity-building?**
- 2. What are the main conditions that reinforce Rwanda's ICT-based social innovation ecosystem?**
 - a. How does Rwanda's *broader environment and society* influence social innovation's growth directly or indirectly?
 - b. What are the main features or Rwanda's *social innovation culture* that support social innovation?
 - c. Who are the *main actors* in Rwanda's social innovation ecosystem, and what are their *main roles* in supporting social innovation?
- 3. What challenges occur in establishing social innovations and scaling their impact in Rwanda?**

Thesis Outline

The thesis starts with an introduction, providing an overview of the study's topic, objectives, and research questions. Chapter 2 outlines the conceptual framework and defines how social Innovation is operationalized in this study. This part contains a literature review regarding the diverse conditions that reinforce ICT-based social innovation, and the role of policy to shape those conditions. Chapter 3 provides contextual background on the rising prospects of impact-oriented ICT innovation in the African continent. The chapter then focuses on Rwanda as an exceptional case. Chapter 4 presents the research methodology, elaborating on the research strategy, design, and methods. Chapter 5 reviews Rwanda's ICT4D policy environment and summarizes the priorities that were identified in policies and strategies during the preparatory document review. Chapter 6 presents the findings of the in-depth interviews with key informants in Rwanda. Chapter 7 discusses the research findings, by interpreting their meaning and relevance, and contextualizes them with literature and external sources. The chapter draws overarching conclusions, potential practical implications stemming from the Rwandan case and indicates suggestions for further research.

CHAPTER 2: CONCEPTUAL FRAMEWORK

Social Innovation

The Social Innovation Concept

Contemporary discourses acknowledge that social change is galvanized by the processes of innovation (Wittmayer et al., 2019). The conventional approach to economic and technical innovation proves insufficient to deal with the ‘grand challenges’ of our time (Kuhlmann & Rip, 2018), or to tackle social issues and unmet needs at local and regional level (Howaldt & Schwarz, 2017). In essence, the calls for social innovation emerge from an overarching discontent with mainstream innovation regarding its profit-oriented technological manifestations (Terstriep et al., 2020).

Social innovation is not a new term. However, the concept recently re-emerged pervasively within scholarship (Morawska-Jancelewicz, 2022), policymaking and public administration (Terstriep et al., 2020), business and civil society organizations (Gasparing et al., 2022; Galego et al., 2022). It is used in industrialized and developing countries in the Global South (Leal Filho et al., 2022).

Presently, we witness a proliferation for resources, projects and strategies directed towards social innovation. Mulgan (2018, 2019), highlighted global booming of digital social innovation, followed by dozens of incubators, accelerators and other physical spaces or transnational networks that promote social innovation, the big expansion of social investment funds, targeted national policy, new legal forms in businesses, academic research centers and specialized courses.

Let alone its increasing influence, social innovation is a contested term (Slee et al., 2021) which remained scattered and fragmented (Foroudi et al., 2021). Teasdale et al. (2021) refer to a dynamic concept whose meaning constantly evolves. There is controversy around what constitutes the ‘social’ and the ‘innovation’ components, its realization, and its impact (Schubert, 2021). Social innovation can be seen as a contemporary buzzword or a normative panacea (Bragaglia, 2021), which is used across multiple types of policies (Ruthemeier et al., 2022).

A seminal definition by Stanford’s Social Innovation Review states: “*A novel solution to a social problem that is more effective, efficient, sustainable, or just than existing solutions and for which the value created accrues primarily to society as a whole rather than private individuals.*” (Phills et al., 2008). In simple words ‘*new ideas that work in meeting social goals*’ (Mulgan et al., 2007p.8).

Social Innovation stands out from mere social change because of its intentionality. However, scholars diverge on whether it is social in its means (goal-oriented) or social in its end (process-oriented) (Onsogo, 2019). Recent research embraces a two-way direction depicting “*the*

development and delivery of new ideas and solutions (products, services, models, markets, processes) at different socio-structural levels that intentionally seek to change power relations and improve human capabilities, as well as the processes via which these solutions are carried out” (Nicholls & Ziegler 2019 p.5).

The essence of social innovation lies in its problem-solving premise (Schubert, 2018), whereby *“when there is broad or durable impact, social innovation becomes disruptive and catalytic”* (Christensen et al., 2006). The benefits of these solutions to social problems apply beyond the confines of the innovators (Foroudi et al., 2021) and aim to *“generate social benefits rather than individual benefits bringing new values for society”* (Kim et al., 2021 p.19).

Social innovation immerses to confront complex problems like climate change, poverty alleviation, inequality, education quality or the ageing population (van Wijk et al., 2019; Stănescu et al., 2020). Thus, social innovation delivers services to solve societal issues where existing market tools and government mechanisms have failed (Kim et al., 2021), as a manner to revitalize the welfare system (Guerreiro & Pinto, 2021; Unceta, et al., 2020).

Nevertheless, social innovation faces critique and skepticism. It is perceived as an attempt to accelerate development by replacing the government’s role and by incentivizing citizens or enterprises to become self-reliant and take over development responsibilities (Bock, 2016). Some underline that social innovation emerges whenever the government and politics fail to address social needs (Dias & Partidário, 2019). Scholars link social innovation to the crisis of the welfare state (Terstiep et al., 2020). Where social innovation is a reliable approach to encounter alternatives to the state funded social services, by *“becoming a sort of compensatory mechanism that serves as a form of “caring liberalism””* (Pinto et al., 2021p.65). Mainstream discourse interprets social innovation *“in terms of market mechanisms and actors and depoliticizes problem framings”* (Wittmayer et al., 2019 p.2).

Social innovation can be expressed as an idea, a social process, a product, a service, a regulation, an intervention, or social movement (Ramadani et al., 2020).

We cannot limit social innovation at a single domain, actor, or sector. It describes heterogeneous initiatives and organizations, including third sector interventions, public policy initiatives or impact-driven for-profit organizations (Rabadjieva, M., & Butzin, 2020). It is often used interchangeably with associated concepts like social entrepreneurship (Slee et al., 2021) or open innovation (Dias & Partidário, 2019). Domanski (2018) underlined that the actors involved in social innovation extend far beyond the ‘usual suspects’ and are not always easy to identify, as they commonly participate in hybrid forms, without identifying through the term social innovation and often without being aware that they engage in social innovation.

Social innovation follows the devolution of boundaries between the nonprofit, government, and business sectors, through 1) the exchanges of ideas and values; 2) shifts in roles and relationships; 3) the integration of private capital with public and philanthropic support (Phills et al., 2008). A comprehensive conceptualization shall include cross-sectoral collaborations

between the state, academia, the business sector, and civil society (Pache et al., 2022; Pittz & Intindola, 2021b).

Social Innovation can emerge as a top-down or bottom-up process (Lukesch et al., 2020). Empirical studies support that social innovation typically emerges through a bottom-up, small-scale process and that is highly local and contextualized, which thus place individuals and civil society as the main agents of social innovation (de Fátima Ferreiro et al., 2021).

Scholarship is also preoccupied on how to scale social innovation. However, scaling is not universally appropriate as innovation is rooted in the local context and cannot be replicated or transferred indiscriminately (Pittz & Intindola, 2022a; Deserti & Rizzo, 2020).

Social Innovation & Technology

Social innovation is closely linked technological innovation (Misuraca et al., 2021). Rapid technological innovation leverages social innovation's diffusion and dissemination, and vice versa, technical innovation may fully evolve when combined to social innovation (Morrar et al., 2017). A better understanding of their interdependence could help the social innovation actors to work more effectively (Bataglin & Kruglianskas, 2022).

Information and Communication Technology (ICT) is a key enabler for social innovation. ICT's role is: (1) administrative, where actors utilize ICT for collaboration, communication, and information organization; (2) disseminative and educational; (3) topical, where the project's topic is directly connected to ICT (Kedmenec et al., 2019). Accordingly, digital tools *“trigger, empower, mediate or even transform existing social innovation processes; but also (promise to) innovate the forms and functioning of society whose constitution is deeply pervaded by digital technologies.”* (Certomà, 2020 p.9)

Social Innovation Ecosystem

Scholarship increasingly takes a systemic approach to social innovation. A relevant explanatory framework is the triple-helix model. It initially described the dynamics between three key actors in fostering innovation and knowledge transfer: the government, businesses and universities (Morawska-Jancelewicz, 2022). The model was later expanded into a fourth-helix one, to incorporate public or civil society (Cai & Lattu, 2022).

Innovation is commonly viewed within the 'innovation ecosystem' perspective, a heuristic model used to explain related collaborations and interactions (Domanski et al., 2020). An innovation ecosystem is *“the evolving set of actors, activities, and artifacts, and the institutions and relations, including complementary and substitute relations, that are important for the innovative performance of an actor or a population of actors.”* (Granstrand & Holgersson, 2020p.3). An ecosystem perspective helps to overcome the actor-centered or entrepreneur-

centered deductive approaches framing an agent-hero, but rather expand the view on the wider environment where social innovation occurs (Pel et al., 2019).

A social innovation ecosystem necessitates: “(1) a mode of governance that integrates actors from civil society, and the social, economic and academic field; (2) social innovation hubs, labs and transfer centres as intermediaries that accelerate social innovation activities; and (3) the integration of different modes of innovation in transformational innovation strategies.” (Terstriep et al., 2020, p.881).

The “ecosystem” which facilitates relevant social innovation activity, remains vague and ambiguous (Terstriep et al., 2020). One shall not generalize on ecosystems as a static and all-pervasive scheme. Authors emphasize that social innovation can be highly contingent (Nicholls et al., 2015) and context sensitive (Vercher et al., 2021; Ardil, 2022).

Enabling Factors for Social Innovation

Despite the tremendous attention paid to social innovation, there is little evidence on how social innovation process occurs, its tools and methods (Churi & Araujo, 2018). Social innovation is not always deliberate (Avelino et al., 2020) nor always a manageable process that happens in a vacuum (Peterson et al., 2020). It encompasses high levels of uncertainty (Dias & Partidário, 2019) and may have unintended consequences (Fougère & Meriläinen, 2021).

The conditions that enable or hinder social innovation extend to individual, organizational and environmental levels (Lekhanya, 2019). Ravazzoli & Valero (2020) described territorial characteristics and contextual factors that influence how social innovation emerges, evolves and scales. The authors included contextual material and intangible resources: natural, financial, social, and cultural characteristics that affect the actors’ capacity to mobilize and transform existing resources. For instance, funding, natural resources, infrastructures; political stability, democracy; as well as social memory, culture and identity, discourses, historical background, leadership and social capital, etc.

Social innovation cannot depend on actors’ agency alone. Van Wijk et al (2019) suggested that the institutional realities involved in the social innovation processes, reflect agentic, relational, multi-level, and situated dynamics.

Global innovation mappings indicate that funding is the major determinant for social innovation (Mulgan, 2019). However, other resources such as expertise and knowledge are far more decisive for social innovation ecosystems to develop their full potential (Domanski, 2018). For Pulford (2011, p.113) “it is the softer, less tangible parts of a social innovation ecosystem that are often missing or underdeveloped. Specifically, the lack of learning and training, support structures at a policy level, and under-development of networks slow the effective development of new solutions. These three areas need more attention.”.

The multi-level interactions and cross-sector collaborations are key enablers. They leverage each actor's competences and resources to identify new novel opportunities, generate ideas and execute reforms through experimentation, cross-fertilization, and lateral thinking (Wascher, 2021; Pittz & Intindola, 2021b; Gerli et al., 2022; Pache et al., 2022). Nevertheless, *“our knowledge of the co-creation process through SI and its driving forces as well as the challenges one might face in cross-sector partnerships remains limited.”* (Sadabadi & Rahimi Rad, 2022).

More, recent literature reviews how physical settings can reinforce innovation activity. Chiefly, there is a proliferation of ‘intermediaries’, including entrepreneurship support organizations (ESOs) and tech hubs or innovation hubs, together with transfer centers, incubators, accelerators, makerspaces, living labs, fabrication labs (Teasdale et al., 2021; Littlewood et al., 2022). There is a rise in smart cities (Kim et al., 2021), science parks or ‘technopoles’ (Znagui & Rahmouni, 2019), research and development centers or “Social Silicon Valleys” (Mulgan et al., 2021).

The list of those ‘innovation nodes’ is non-exhaustive. Selectively, technology and innovation hubs are centers *“for learning, ideas, co-creation and community, that nurtures innovative ideas and market disruption, and supports creative ways of solving problems through offering on-the ground support across the entirety of the startup lifecycle.”* (Afrilab-Briter Bridges, 2019). Innovation hubs originate in the Global North amid an increasingly fluid knowledge economy (Jiménez & Zheng, 2021). They are designed to build communities and provide diverse services like coworking space, events, mentoring, product development, etc. They are increasingly seen as engines for holistic socio-economic development, as they integrate local and non-local knowledge (Mwantimwa et al., 2021).

Another widely explored theme is the acquisition of an *“innovation culture”* in a society or an organization (Sartipi et al., 2021; Plugmann, 2022). An innovation culture encompasses partnership, knowledge sharing, and the community's enthusiasm to innovate (Kassim et al., 2022). For Bas (2022), ‘innovation culture’ has a proactive nature, is endogenous, complex, holistic, sustainable and long-term focused, based on a strategic and systematic vision for purpose-making. Terstiep et al. (2020) underlined the importance of studying the cultural basis of innovation, which extends into values of responsibility, engagement, and cooperation. For the author, most of social innovation occurs far from merely economic thinking and financialization and manifests through associative or cooperative ideas.

The relation between the state and social innovation is complex and understudied (Bragaglia, 2021). While some scholars argue that systemic factors, like the political, legal context and governance, shape social innovation, others claim that field actors are the ones that drive social innovation (Van Wijk et al., 2019; Pinto et al., 2021).

Public funding, regulation and policy can leverage socially innovative practices, and higher-level institutionalization allows individuals to learn from situated experience (Moulaert et al., 2017). Policymakers may purposively shape the contextual characteristics that support such initiatives, and thus affect its ultimate outcomes (Ravazzoli & Valero, 2020; Ozdemir & Gupta, 2021).

Pinto et al. (2021) argue that the State shall not only actively promote social innovation but be an Entrepreneurial State in itself. The ‘Entrepreneurial State’, a term coined by Mazzucato (2013), echoes in scholarship. It supports that States shall act as hybrid organizations combining top-down and bottom-up organizational formats and discards the notion that innovation is mere outcome of market-driven mechanism (Peter, 2021). This analysis underscores that States shall take risks, be proactive and manage uncertainty in unleashing and supporting social innovation to address complex problems and shall cooperate with other actors (Kattel et al., 2022).

Social Innovation & Policy

‘Social innovation policy’ is not a standardized notion and should not be understood as a stand-alone policy domain. Scholars refer to a comprehensive innovation policy with social innovation as one integral dimension, to sectoral or mission-specific policies that integrate social innovation practices (Chan et al., 2022; Mulgan, 2021). Terstriep et al. (2020) noted *“Social innovations are positioned in a broad range of policy fields, and even within policy fields distinct types of SI exist. In addition, social innovations aiming at path-breaking, must cope with specific modes of regulation and governance within the different policy fields.”* (p. 892).

Social innovation became a prominent concept among political leaders and administrations (Slee et al., 2021; Mulgan, 2021). Public policies are crucial throughout the lifecycle of social innovation, from its early development to implementation and upscaling (Deserti & Rizzo, 2020). They can *“stimulate the supply and/or demand for innovations as well as creating an environment in which they can develop”* (Polman, 2019 p.178).

Nevertheless, attempts to manage social Innovation through policy prove decidedly difficult (Cipriani et al., 2021). Social innovation policy differs from traditional innovation policy regimes that target mere technological innovation, e.g., policy authority is dispersed across ministries (Krlev et al., 2020). More, *“policies that govern social innovation and social entrepreneurship tend to be conservative in both risk-taking and uncertainty management. This often hinders the process of innovation, forcing organizations to opt for more conventional solutions instead of novel ideas: something that is the antithesis of social innovation”* (Pinto et al., 2021 p.66).

A limited body of literature has identified broad patterns in social innovation policymaking. For instance, De Pieri & Teasdale (2021) discussed two ideological pathways: 1) a radical empowerment approach, where actors collaborate to define social value, and the state guarantees their basic rights, 2) an incremental market-oriented approach, which draws on liberal and market-oriented ideas, where the market’s force is determinant whilst the state has a limited role. In essence, *“the forces of the market and private initiative determine what the problems are and how best to fix them.”* (p.104).

Hulgård & Ferreira (2019) articulated four discourses in public policy: “Volunteerism” that values private responsibility, and minimal state intervention; “Social Movement”, where public policy shapes the conducive conditions for the civil society to lead; “New Public Management”, where social innovation arises through private sector practices and market rationality, and public policy encourages competition, privatization and supports the innovation ecosystems through market-oriented tools, as a *“planned process along a set of stages within an induced and supportive social innovation ecosystem.”*(p.27); “New Public Governance” where policy regulates multi-level inter-organizational networks lead the ecosystem.

The Social Innovation ‘Policy Menu’

Scholars distinguish between ‘policies for social innovation’ which are designed to support actors’ capacity to affect structural change, and ‘Policies as social innovation’ where policymaking processes offer novel approaches to social innovation planning and delivery (Nicholls & Edmiston, 2018).

This study concerns ‘Policies for Social Innovation’. For this strand, Reynolds et al. (2017) conceptualized a ‘policy menu’ that integrates mechanisms from conventional innovation policy and entrepreneurship policy, including:

- **Access to Suitable Funding and investment:** direct loans or grants to social innovators, measures to leverage a social investment, or novel forms of financing instruments, etc.;
- **Building skills and capacity among innovators and social ventures:** intermediaries and network organizations, training and education on social entrepreneurship, funds for capacity building in targeted areas; funding research on social innovation;
- **Novel Regulation and legislative frameworks:** introducing new forms of finance and new business models, or smart regulation that allows experimentation with innovation;
- **Using innovative public procurement and commissioning to create a market for social innovation:** for instance, setting social value as a prerequisite in procurement decisions, attaching socially-oriented providers into public sector supply chains, implementing challenge-based procurement models;
- **Awareness raising, championing, and connecting:** *“Policymakers can help to improve the legitimacy and visibility of social innovation through initiatives that map and measure activity, and attempt to measure its impact and contribution.”*(p.13). Examples include blueprints measuring social innovation for evidence-based policymaking, competitions, awards and social innovation events;
- **Using public assets to foster social innovation:** instrumentalize public assets e.g. opening up public datasets and platforms to innovators, adopt ‘sharable cities’ policies.

The two strands of social innovation policy

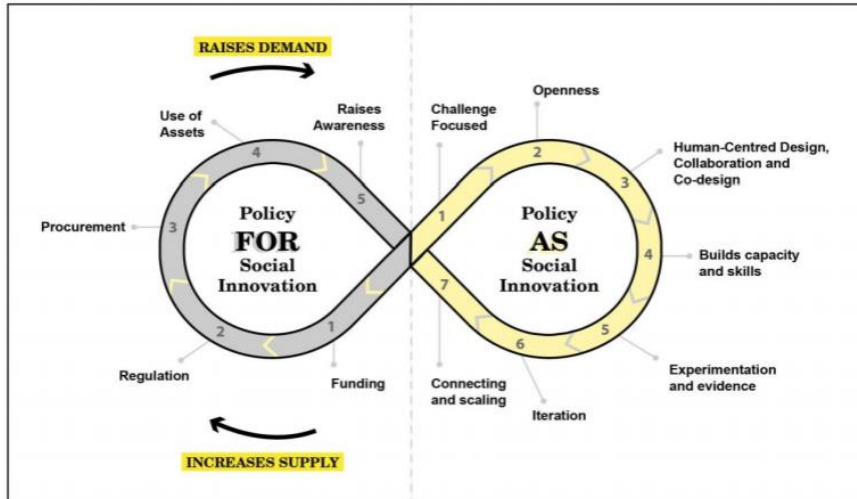


Figure 1 The two strands of social innovation policy (source: Reynolds et al., 2017)

These tools are investigated in scholarship independently. For instance, Lukesch et al. (2020) focused on capacity-building and proposed “*Investments into opportunity structures like physical and virtual education facilities, third sector employment opportunities, regional and local development hubs and agencies, IT connectivity, technology centers, business incubators, co-working spaces, and advisory and information services improve the milieu in which social innovation can emerge and grow.*”(p.7).

Knowledge Society & Knowledge Economy

Scholars argue that we have transitioned into a ‘**knowledge society**’. A knowledge society generates, organizes, distributes knowledge as an actionable resource that can be used to improve the human condition and socioeconomic development (Carvalho, 2021; Lopes, 2021). In the knowledge society, exchanges of technology, innovation and immaterial goods constitute principal economic factors and engines of knowledge production (Szyszlo, 2018). It is strongly aligned to technology, but not exclusively. It forms “*a result of the contemporary societal change pushed by technological innovation and institutional transformation, which is not only about technological innovations, but also about human beings, their personal growth and their individual creativity, experience and participation in the generation of knowledge.*”(Yigitcanlar, 2015)

The term “**knowledge economy**” describes an economy where the production is largely based on accumulated knowledge (Ukwueze et al., 2021). Thus, the knowledge society formulates the knowledge economy as one of its central features (Petrushenko & Vorontsova, 2019).

Until recently, industrial economies were conceived in terms of physical and financial capital (land, equipment, buildings, labor, property). With the 3rd industrial revolution and the information revolution that followed, world economies were transformed and globalized

amidst the diffusion of Information and communication technologies, urging the 4th industrial revolution (Moll, 2022; Dogaru, 2020). Presently, knowledge or intellectual capital turn into a primary resource for economic and social development (Choong & Leung, 2022).

Inherently, new knowledge intensifies productivity, innovation, and technological progress, which sequentially lead economic growth (Alnafrh & Mouselli, 2019). Policy discourse on the knowledge economy emphasizes technology-led growth, where ICT is considered a central tool for development and an ‘inclusive’ asset for society members (Verma et al., 2022).

The roadmap to transition into a knowledge economy and society is not identical for all countries. This evolution does not occur equally around the globe, which reflects the cognitive disparity between the developed and the developing world (Baguma & Finquelievich, 2021; Choong & Leung, 2022). Further, knowledge societies do not emerge through a one-dimensional, straightforward identical pattern but follow dissimilar processes (Stehr, 2018).

Information & Communication Technology for Development (ICT4D)

Information & Communication Technology

Information and Communication Technology (ICT) is an umbrella term which embodies a diverse set of technologies that augment communication and facilitate disseminating information (Nath, 2019). It overlaps with Information Technology (IT), yet ICT focuses on communication technologies, which include the internet, wireless networks, phones, and other communication mediums (Ratheeswari, 2018).

Heeks (2017), categorized ICT into 1) Digital ICT that processes or communicates digital data; 2) Electrical ICT which handle data in electrical or electro-magnetic form; 3) All ICT, with entities that process or communicate data in any form. We currently switch into digital ICTs (Rothe et al., 2022). This happens in parallel to the forthcoming Industry 4.0, and the rise of new elements like 3D-printing, autonomous vehicles (including drones) and blockchain, robotics, artificial intelligence, machine learning, cloud technologies, the Internet of Things and new digital platforms (Heeks, 2020a).

ICT for Development (ICT4D): An Overview

The Information and Communication Technology for Development (ICT4D) is a diverse, interdisciplinary field of research and practice, which engages stakeholders globally (Dearden & Kleine, 2021). It bridges the perspectives of three study fields: computer science, information systems, and development studies (Schelenz & Pawelec, 2022)

ICT4D is driven by the conviction that ICTs can be used to foster development and improve human lives worldwide, revealing a causal relation between technological growth and social

change (Rothe et al., 2022). ICT4D research and practice largely focus on the developing world and the materially disadvantaged populations of those societies (Potnis, et al., 2022; Vaidya & Myers, 2020). ICT is typically framed as disruptive or transformative, and such initiatives anticipate that the introduction of new technologies has the potential to alleviate social concerns (Karanasios & Slavova, 2019), including economic growth, governance, health, education, poverty, etc. (Rothe et al., 2022; Makanjera, 2020). Moreover, ICTs are expected to boost the democratization processes, through amplifying access to information (Keja & Knodel, 2019).

The ICT4D domain traces back to the 1980s (Avgerou, 2017). Currently, we experience a paradigm shift from ICT4D to ‘digital development’ where digital ICT forms the platform that incrementally mediates international development (Heeks, 2020a; Tillet, 2020).

Scholars suggest we must explicitly conceptualize each of ICT4D components: ICT, Development, and “4” –which signifies the transformational process linking ICT to D (Sein et al., 2019). ICT4D researchers and practitioners stay divided between ‘ICT’ and ‘development’ (Adesemowo, 2020). Research should manage ‘Theories of Change’ to explain how and why socio-technical change occurs (Zheng et al., 2018).

More, ICT4D research requires a foundational theory that problematizes the essence of development (Khene & Masiero, 2022). Development is a contested notion, with large theoretical variation across sectors and time periods (Sein et al., 2019;). ICT4D research has been critiqued for lacking a joint conceptual grounding in development studies, as it extends along distinct normative development views (Yim & Gomez, 2022; Heeks, 2020a). Overall, there is a consensus that development should be considered in terms beyond economic growth (Khene & Masiero, 2022; Schelenz & Pawelec, 2022). The ICT4D literature reveals four development realms: development as increased freedom, as increased inclusion, as higher economic productivity, and as improved well-being (Chipidza & Leidner, 2019).

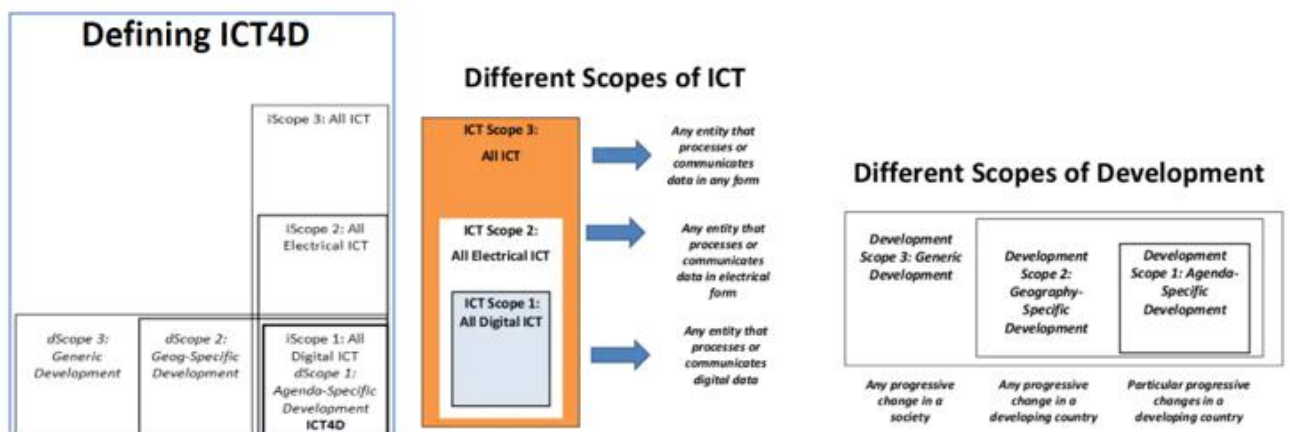


Figure 2 Defining ICT4D (Source: Heeks, 2017 as adapted by Shao, 2018)

The ICT4D domain receives strong skepticism. Scholars question its premise for ‘leapfrogging’ and its ‘revolutionary’ effect (Keja & Knodel, 2019). Chiefly, there is recurring critique over ICT4D’s techno-optimism and techno-determinism tendencies (Schelenz &

Pawelec, 2022; Dearden & Kleine, 2021). Accordingly, there is a “*knowledge gap over the link between ICT intervention and development in the context of developing countries*” (Sein et al., 2019, p.8). Research suggests that ICT4D has no formal evaluation frameworks (Yim & Gomez, 2022). Assuming a linear, causal relationship between ICT diffusion and development outcomes underestimates contextual and other prevailing conditions involved in complex trajectories of ICT-based socio-economic change (Krauss, 2022). More, published work treats ICTs as accelerators and lacks reference on potential side-effects and incoherencies (Rothe et al., 2022). ICTs may reinforce uneven development and amplify existing inequality within and across societies (Schelenz & Pawelec, 2022). Scholars discuss ICT4D within global power asymmetry. Commonly, ICT4D projects are produced in developed countries and then exported to developing nations. Thus, technology diffusion may reinforce the consumer-producer division between the Global North and the South (Dearden & Kleine, 2021; Schelenz & Pawelec). Further, ICT4D initiatives are scrutinized for their emancipatory ethos and Western-centric modes (Khene & Masiero, 2022) or for failing to integrate local expertise and adaptive capabilities (Jimenez et al., 2022; Krauss, 2022).

Contextual Importance & Southern Perspectives

Contextual reasoning in ICT4D research follows the universalistic perspective or the situated perspective, which are discernible in the transfer and diffusion processes and the socially embedded processes, respectively (Avgerou, 2010). ICT4D must function within complex social, political, economic, and cultural conditions (Schelenz & Pawelec, 2022). Nevertheless, ICT4D initiatives often lack such sensitivities (Thapa & Omland, 2018), or are “*interwoven with the assumptions and prejudices of those identifying and representing context from the outside.*” (Krauss, 2022 p.137).

Authors discuss ICT4D through Global North-Global South dichotomies. Zhang et al. (2022) describe: “*the common North–South or center-to-periphery path of technology industries and ICT4D interventions.*” (p.13) or “*the common ICT4D approach of top-down or North–South delivery of ready-made equipment*” (p.5). ICT4D research and practice often ignores local realities and deep-rooted challenges in developing countries (Schelenz, L., & Pawelec, 2022).

ICT4D research can contribute to addressing issues related to neo-colonialism or neoliberalism (Andoh-Baidoo, 2017). Research can enrich ICT4D’s theoretical foundations which remain dominated by the Global North’s colonial imposition, by engaging with perspectives in line with the post-colonial and pre-colonial Global South (Dearden & Kleine, 2021).

ICT-Based Social Innovation in this Study: An Operational Definition

In this thesis, “social innovation” will be understood through its interface with technology. The study’s operational definition is:

“Social Innovation refers to ICT-based Innovation whose primary goal is to tackle social challenges”

Further, the study refers to formal planning practices that foster ICT-led social innovation as reflected in public policies and strategies. Acknowledging that social innovation is not established as a stand-alone policy domain, the thesis traces the social innovation framework as it manifests within the broader existing policies. Social innovation will then be identified by visiting policies in ICT4D and ICT Innovation, considering ICT-based social innovation as an integrated part within them.

The figure below illustrates how ICT-Based social innovation relates to associated concepts in this study.

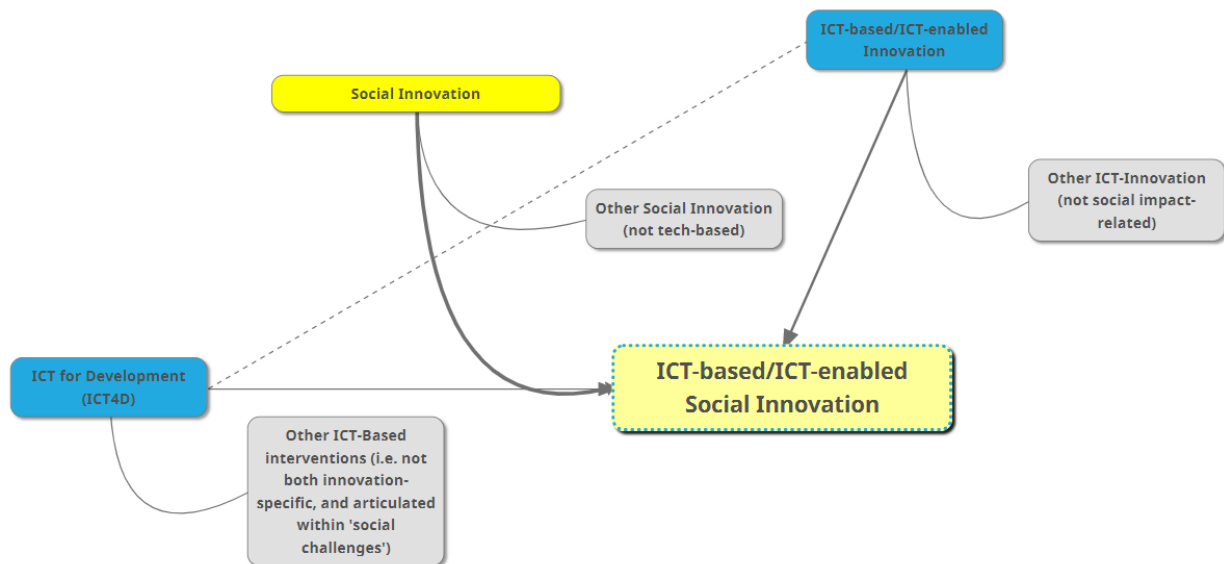


Figure 3 Concept mapping for ICT-based Social Innovation (Source: developed by the Author)

CHAPTER 3: ICT INNOVATION IN AFRICA

Innovation in the Global South

The conventional innovation theories follow the ‘diffusion model’, where knowledge and technology flow smoothly from the ‘core’ to the ‘periphery’, meaning the Global North to developing countries, where innovation is to be used (Glückler et al., 2022). Avgerou (2010), suggested that ICT should adhere to ‘social embeddedness’. Although ICT4D largely reinforce the diffusion model (Heeks, 2020b; Zheng, 2020), recent scholarship on social innovation increasingly focuses on how users, communities, or networks in the Global South get involved in addressing their own challenges (Busch & Barkema, 2022; Woodson & Williams, 2020; Moyo & Ndlovu, 2021).

‘Southern innovation’ is often discussed in conjunction with *reverse innovation*, *disruptive innovation*, *frugal innovation*.

Frugal innovation describes innovation that occurs in constraint environments and invokes ideas of frugality and low-cost or low-price solutions or products (Khan & Melkas, 2020; Santos et al., 2020). Frugal innovation is primarily proposed in developing countries and emerging markets, but it is also relevant to advanced economies (Niroumand et al., 2020; Hossain, 2022). A key aspect of frugal innovation is satisfying the needs of the Bottom-of-the-Pyramid (Lorini et al., 2022).

Frugal innovation is often described as “*new, low-cost, and resource-efficient products and services aimed at providing low-income groups with affordable products and services*” (Ploeg et al., 2021 p.93). Apart from affordability, frugal innovation has added value. They encompass “*the ability to ‘do more with less’- that is, to create significantly more business and social value while minimizing the use of diminishing resources such as energy, capital and time*” (Radjou & Prabhu, 2015 p.xv).

Reverse innovations challenge the recent global status quo in innovation (Moradeyo, 2022). They are developed and tested in low-income countries, and subsequently scale up to high-income countries (Zinsstag et al., 2019). Reverse innovations diffuse from “*low-income customers to high-income ones, from developing countries to developed ones. However, before reaching the more developed countries, they diffuse through neighboring or distant countries with similar socioeconomic settings.*” (Hossain, 2020 p.3). Scholars bring examples of frugal innovations that entered developed markets as reverse innovations (Niroumand et al., 2020).

Disruptive innovation describes “*a process in which an entrant's innovation first gains a foothold in a niche market*” (Petzold et al., 2019 p.158). Such innovation stimulates the creation of new market or a business niche and produces a novel concept of product values that overrides the current market (Ab Rahman et al., 2017). Disruptive innovation relates to a process rather than an outcome, and is initially directed to low-end or new markets (Si et al., 2020).

Rising Prospects for ICT in Africa

As digital ICT come at the frontline scholars investigate Africa's digitalization pathway and its roadmap to the 4th Industrial Revolution (Dosso et al., 2021). ICTs and technological innovation are recognized as a central engine to pursue multidimensional socio-economic goals across Africa and bring prosperity (Hammami & Zotto, 2020). Chiefly, digital entrepreneurship is the driver of Africa's development in the 21st century (Mafimisebi & Ogunsade, 2022)

ICT's potential to Africa's development is largely discussed within the premises of the 'leapfrogging' hypothesis (Umukoro, 2021) or as a 'catch-up' opportunity (Wasserman, 2021). Leapfrogging reflects the idea that ICTs can be utilized to bypass processes of development to reach the dominant stage (Ezeani, 2022; Němečková, 2021). Steinmueller (2001 p.194), who coined the theory, argues that "*ICTs have the potential to support the development strategy of leapfrogging, i.e. bypassing some of the processes of accumulation of human capabilities and fixed investment in order to narrow the gaps in productivity and output that separate industrialized and developing countries.*". In such views, in Africa, the conventional model of agricultural transformation and industrialization through manufacturing has been disrupted (Shava, 2022). With the emergence of 4.0 industry technologies, economic pathways are explored beyond the resource extraction exploit the markets and the possibilities enabled by digital technologies (Daniels & Amadi-Echendu, 2021).

Africa's technology potential is appreciated considering the large-scale demographic transformations with an increasing youth bulge and "*urbanized in larger and larger cities with more and more urgent demands in terms of work, health, education*" (Frimousse, 2019p.13).

African states integrate Innovation and ICT entrepreneurship as vehicles to reach national strategic goals e.g. Vision 2030 Namibia, Vision 2030 Kenya, Vision 2020 Malawi (Yongabo & Göransson, 2022). The high hopes for the home-grown digital economy led to massive investment in the technology sector (Friederici, 2018).

The literature examines empirical evidence on tech innovation initiatives in Africa across diverse objectives and sectors like healthcare, mobility, agriculture, education, finance, sustainable energy, democratic governance (Hanson et al., 2020; Shava, 2022).

Innovation scholars underscore the innovation capability and transformative potential of African innovation ecosystems (Allard & Williams, 2020). Tech financing is growing, start-ups proliferate, and product increasingly get to the market centered in areas dubbed with monikers like 'Silicon Savannah', 'Silicon Cape', or 'Yabacon Valley' (de Falco, 2022; Eke & Ogoh, 2022). Those emerging ecosystems attracted attention for their potential to transform the continent and bring social, environmental, and economic change (Pollio & Cirolia, 2022).

De Beer et al. (2017) classified those nodes, where innovation is congested, as cluster hubs (small geographic regions with high density of hubs), company hubs (for-profit or non-profit legal entities) or country hubs (large area with a distinct political identity and/or several similarly governed sub-regions).

Emblematically, social innovation in Africa develops within tech and innovation hub organizations. Over the last decade, hubs have proliferated across the continent (Littlewood et al., 2022). Tech hubs stimulate the creation of socially and locally relevant technologies and humanitarian innovations that address local problems (Kolade et al., 2021; Jiménez & Zheng, 2021).

Hubs may specialize as incubators, accelerators, living labs, fabrication labs, coworking spaces, hackerspaces, or makerspaces (Dosso et al., 2021; Armstrong & De Beer, 2021). Hubs connect stakeholders of African tech innovation and are envisioned to constitute the foundation of Africa's 'knowledge economies', 'digital economies' or 'ecosystems' (Friederici, 2018). Atiase et al. (2020) note that hubs could provide alternative streams of research, innovation and local knowledge production based on community participation, taking the lead away from traditional African Universities which face significant constraints.

Many African countries set plans to build 'innovation cities' to facilitate ICT-based innovation development (Velame & da Costa, 2020; Pollio & Cirolia, 2022). For instance: True Wakanda in Ethiopia, Hope City in Ghana, Konza Silicon Savannah City in Kenya, Ebène Cybercity in Mauritius, Eko Atlantic in Nigeria, Kigali Innovation City in Rwanda or Waterfalls in South Africa (Mkalama & Ndemo, 2020; Arku et al., 2022). Nevertheless, critical voices question whether Silicon Valley's capitalist start-up centric approach is suitable or beneficial for local diverse and nontraditional sites of innovation (Marchant, 2018). The idea of urban neoliberalism and urban entrepreneurialism as an optimal mechanism to poverty reduction and economic gains seems 'over-ambitious' (Olajide & Lawanson, 2022). For others, "*the neoliberalization and marketization of urban space only benefits the elite, transnational class and capital investors*" (Bandaiko & Arku, 2022 p.13). De Falco (2022) proposes alternative models outside of those behind the Silicon Valley models would be better-fit scenarios to Africa's historical and geographical characteristics, such as social innovation, sustainable innovation, and solidarity development.

Social innovation cultures remain very diverse worldwide (Mulgan, 2018). Yet, there are similarities across Africa. Fu (2020 p.xvii) describes African innovation as 'under-the radar', attaining that "*This is not based on R&D as is the case of industrialized countries, nor purely 'frugal' or 'inclusive' in nature as assumed by many Asian low-income countries, but innovative in a creative African way – low-cost innovations, based on individual creativity, practice, organizational learning and adaptation. [...]In short: innovation to survive.*"

Africa's ICT innovation is largely described as youth-driven stemming from the African 'youth bulge' (Akanle & Omotayo, 2020). Innovation is predominantly developed at grassroots level, referred to as bottom-up (genannt Halfmann et al., 2018), and often concerning the Bottom of the Pyramid markets (Muthuri et al., 2021). Further, scholarship emphasizes the resource-constrained environment where Africa's social innovation evolves; often framing it as frugal or driven by necessity (Ploeg et al., 2021; Lorini et al., 2022).

Accordingly, African social innovation and entrepreneurship are very active in informal institutions and the informal economy across the continent (Guma, 2021; Sheikh & Bhaduri,

2021). Some posit that Africa needs non-conventional models that can capture the multi-level informality and self-taught elements where innovations emerge (Jegade, 2020). African social innovation tends to start informally and often remains so; yet formal-informal collaboration is growing (Millard, 2018).

Scholars suggest that African tech innovation is increasingly homegrown, following an aspiration to re-design existing solutions with cost-effective alternatives that are appropriate to local needs and contexts (Rahim, 2017; Friederici et al., 2020). Research confirms that African national cultural values can affect innovation and entrepreneurship behavior (Abubakre et al., 2021; Igwe & Icha-Ituma, 2020). Mavhunga (2017), who focused on knowledge-production in the African imaginary, asserted that Africans find themselves “*between their locally generated and inbound ideas, instruments, and practices*”(p.9), adding “*The most inspirational and urgently needed innovations derive from people who respect and thoroughly understand local modes of knowledge and build upon them.*” (p.21).

The Example of Kenya

Kenya, home to Silicon Savannah, is a leader of Africa’s digital economy, hosting surprisingly numerous start-ups, has large presence of multinational companies (Němečková, 2021), and a notable ‘expats’ community engaged in the ICT sector (Rosenberg & Brent, 2020). Kenya’s advanced ICT infrastructure, high internet penetration, the lively technology scene (incl. hubs, accelerators, competitions, etc.), flagship innovative ventures delineate a developed ICT ecosystem in the Eastern African region (Muathe et al., 2022; Martins et al., 2021). The literature often narrates Kenya’s innovation as innovation ‘from below’, emphasizing youth ICT entrepreneurialism, start-up activity (Grzeslo, 2020) and ‘revolutionary’ creative citizen involvement (Ndemo, 2017). Martins et al. (2021) underline that Kenya’s tech-based entrepreneurial ecosystem revolves around social impact, with a confluence of international organizations and multinationals, with informal networks and start-ups. They notice that Kenyan innovation has passed from necessity-driven to opportunity-driven ventures.

Kenya is home to some of the continent’s most prominent grassroots innovations. For instance, Ushahidi is a crowd mapping platform which combined “*crowdsourcing, citizen journalism and geospatial information to drive social activism and public accountability.*” (Bonina et al., 2021 p.24). Chiefly, M-Pesa is a pioneer tool that addresses financial exclusion, through mobile financial transfers (Osongo, 2019). Kenyan innovations attracted global media attention, and many were exported to other world regions. They feed into the Global North’s increasing interest in local technologies and locally inspired content that is relevant to local, regional and global users (Horowitz & Botero, 2020).

The Example of Ethiopia

Ethiopia is one of the fastest-growing African economies (Sisha, 2020). The country's vision of becoming a middle-income country led to massive investment in human capital and research-incentive activities (Hussen & Çokgezen, 2019). The Ethiopian government set ambitious plans to boost research and development, encouraging 70% of university students to enroll in STEM sciences (Desta, 2018). Albeit the government's proclamations to boost innovation, Ethiopia's objectives in ICT Innovation have not materialized, which is largely attributed to "*internal conflict and displacement, low internet diffusion, a low human development index and corruption*" (Williams et al., 2022)

More, Desta (2018) asserts that this level of government control affects Ethiopians' liberty to innovate. Contrary to liberalized markets like Rwanda or Kenya, Ethiopia has developed a "*more closed model of the developmental Internet, where all powers firmly rest in the hands of a government that has refused (so far) to entertain and engage with alternative ideas of the Internet*" (Gagliardone & Golooba-Mutebi, 2016p.1). Similarly, Shkabatur et al. (2022) observed a minimal collaboration between ecosystem actors and suggested that Ethiopia decentralizes innovation structures to facilitate the role of the private sector.

Social innovation in Ethiopia is streamlined through informal channels and presents localized characteristics (Amankwah-Amoah, 2019). Innovation is produced and diffused through traditional knowledge systems. For example, Wedajo et al. (2019) illustrated how indigenous social institutions like the Afoosha society facilitate effective innovation diffusion and technology adoption.

Africa's Representation & Global Narratives

This 'innovation hype' changes how Africa is represented and understood. Africa's digitalization stories narrate Africa as an untapped pool of digital talent and discuss the continent's leapfrogging potential with flourishing start-ups and tech hubs (Littlewood et al., 2022). With internet penetration and new technologies "*Africans are increasingly getting empowered to undermine the dark continent narrative*" (Mogaji, 2021 p.250). Thus, the "Africa Rising" narrative is underpinned by an "Africa Tech Rising," surrounding Africa's mobile revolution (Osiakwan, 2017). Engaging in innovation also embraces a pan-African idea to find 'homegrown solutions' that are suitable to the local context (Adelle et al., 2018).

Rwanda's Tech-led Development Trajectory

Rwanda is known for one of the most horrific crimes in human history. The 1994 Genocide against the Tutsi ethnic group and moderate Hutu (Holmes, 2018) became “*a blight on the world's conscience*” (Thomas, 2018 p.50). In one hundred days, nearly one million people died, and those who escaped the catastrophe were left with severe trauma (Gaspar et al., 2022).

The genocide left the country in ruins socially and economically and “*devastated a generation of trained teachers, doctors, public servants, and private entrepreneurs along with its societal, political, and economic fabric.*” (Nkusi et al., 2020 p.550). Rwanda's road to peacebuilding and recovery was based on a four-pronged strategy, under Paul Kagame's presidency: Commemoration to inhibit genocide denial, Civic education fostering a post-ethnic national identity, Socio-economic development; and Reconciliation through justice (Clark, 2019).

Rwanda mainstreamed ‘home-grown’ initiatives in its development trajectory, implying community participation and national ownership (Hasselskog, 2020; McNamee, 2021; Behuria & Goodfellow, 2019). Rwanda's governance and development system incorporate indigenous practices like Umuganda and Ubudehe for participatory community development, the Girinka social protection scheme, or the Abunzi justice system (Odhiambo, 2020)

Today, Rwanda demonstrates a radically different reality. The leading party PRF took drastic measures to rebuild the nation, and the country emerged as a strong state internationally and domestically (Lisimba & Parashar, 2021). Rwanda is often referred to as a “success story” of post-conflict re-development (Gaudreault & Bodolica, 2022; Kral, 2022) or the “Rwandan Miracle” (Rwigema, 2022). Authors refer to the “Rwanda model” to identify what elements constitute Rwanda's development trajectory (Garrett, 2018; Gaudreault & Bodolica, 2022)

McNamee (2021) claimed that no other country divides opinions that fiercely: “*Rwanda is a remarkable development success, risen from the ashes of mass ethnic slaughter, steered and safeguarded by a visionary leader; OR, a case of autocratic recidivism, masked by implausibly rosy statistics and a bogus narrative of national unity, contrived by a strongman intent on staying in power forever.*” (p.380).

Rwanda employed strategies to create a viable market economy, reduced poverty and promulgated legal and policy measures to raise employment, improve health and education, and reinforce social cohesion and inclusion (Abbott & Sapsford, 2021; Nagar, 2021)

Rwanda's remarkable progress since the 1994 tragedy, includes steady economic growth, rising standards of living and progressive social reforms focused on ethnic and gender equality (Berry, 2015; Rwigema, 2022). Thomas (2018) called this extraordinary phenomenon a ‘triple crown’, with rapid economic growth, robust poverty reduction and shrinking inequality.

The Rwandan government's effort to attract investment, strengthen the private sector and encourage entrepreneurship, made the country known for its ease of 'doing business' (Baguma & Finquelievich, 2021) scoring at the top-30 of the World Bank's ranking (McNamee, 2021). Given the exceptionally young population, Rwanda considers youth entrepreneurship fundamental for economic growth and development (Blimpo & Pugatch, 2021).

State institutions are stable and functional, with an ultra-market-friendly approach (Cieslik, 2022; Gaudreault & Bodolica, 2022). Rwanda has strongly state-controlled public policy (Raphael & Komakech, 2020). For Nyoni & Bonga (2019), African nations shall learn from Rwanda's "good governance" and "proper macroeconomic management". Rwanda is recognized for its strong anti-corruption agenda (Raphael & Komakech, 2020; Ciešlik, 2022).

Aid donors praised the Rwandan leadership's "*accountability, transparency, and efficiency in deploying its scarce resources to key sectors of the economy.*" (McNamee, 2021 p.388). Accordingly, Rwanda is labelled as 'Singapore of Africa' (Baguma & Finquelievich, 2021).

Rwanda is often considered a developmental state (Bisoka & Geens, 2021; Nagar, 2021), for its emphasis on development ideology, the leader's preference for 'social engineering', and the high economic performance (Takeuchi, 2019). Yet Rwanda's approach is unique:

"The Rwandan State features several attributes of the classic developmental state: a transformative leadership with a developmental vision, closely intertwined business and political sectors and a highly effective public bureaucracy. What makes Rwanda different from states with similar developmental ambitions, is the unique post-genocidal setting and special homegrown solutions." (Biedermann, 2016, p.139)

Rwanda's success story depicts the gravity of a clearly articulated development vision, based on quantitative measures (Nyenyenzi Bisoka & Geens, 2021). McNamee (2021) claimed that Rwanda's policy shifts support the creation of an investment-friendly, modernizing economy, encapsulated into regional integration efforts, while promoting a shift in people's mindset to embrace Rwanda's new economic identity.

Rwanda's development planning is guided by Vision 2020, which was later reworked into Vision 2050 (Thomas, 2018). Launched in 2000, this ambitious framework guides policies for future development (Yongabo & Göransson, 2022). Rwanda endeavored to transform from an agrarian economy into a knowledge-based society and achieve middle-income status by 2020 (Munyengabe et al., 2018). This objective was reset as "*an upper middle-income country by 2035 and high-income country by 2050 through transforming its economy from agrarian base to a more industrial, diversified and knowledge-based economy*" (GoR, 2019, p. 64).

ICTS in Rwanda

Rwanda's government recognized ICT as a key enabler for long-term national priorities and created a national ICT policy already since 2000 (Munyengabe et al., 2018). The government

identified science, technology, and innovation as the backbone to drive prosperity and solve Rwanda's myriad of problems (Lisimba & Parashar, 2021). Unlike other African countries, Rwanda is particularly poor in natural resources but turned this into an opportunity to adopt distinct development strategies (Baguma & Finkelievich, 2021). The pro-ICT public policy led to continuous public reforms, with decisive investments in soft (educational, intangible) and hard infrastructure (Aubert, 2018).

Presently, Rwanda fosters a technology-led development. The government invests heavily to create a conducive environment for ICT adoption, with digital infrastructure, platforms, and services, to promote digital skills and to foster a national culture of innovation (Mkrtchyan et al., 2020; Yongabo, 2021; Shava 2022; Nwaka, 2021). Rwanda envisages becoming a leading regional ICT innovation hub and set concrete plans in this direction (Yongabo, 2021).

Rwanda's progress is championed. ITU recognized Rwanda's "*proactive strategic vision for the ICT sector*" (Baguma & Finkelievich, 2021p.64). The World Economic Forum ranked her as top performer in Africa at "Government Success in ICT Promotion", "ICT use and Government Efficiency" and "Impact of ICT on access to basic services" (Nsengimana, 2017).

The leading actor in Rwanda's innovation ecosystem is the state. Crisafulli and Redmond (2012) linked President Kagame to a '*CEO of Rwanda, Inc*' boldly executing his vision of a free market, technology-based Rwandan economy. Kano (2021) notes that the Rwandan government has been "inordinately" successful in disseminating and persuading citizens toward the ICT-focused vision and underlines Rwandans' unique mindset for social contribution through ICTs. The vision to become the "Singapore of Africa" is encouraged, or actively promoted, by President Kagame (Friederici, 2018).

"In Africa, we have missed both the agricultural and industrial revolutions [but] in Rwanda, we are determined to take full advantage of the digital revolution. This revolution is summed up by the fact that it no longer is of outmost importance where you are but rather what you can do—this is of great benefit to traditionally marginalized regions and geographically isolated populations" (Paul Kagame, 2006; as cited in Graham, 2019 p.7)

Nevertheless, Rwanda's trajectory includes obstacles. The ICT industry remains a small part of the economy (Kano, 2021), and the digital infrastructure lags (Grant, 2019). Connectivity is still low with 3.54 million internet users, and an internet penetration rate of 26.3% (January 2022 est.) (Kemp, 2022).

Rwanda produces remarkable social innovations. For instance, RapidSMS system is an mHealth program seeking to improve maternal and child health (Ndayizigamiye, 2022). Rwanda was also the first country to introduce drones in blood delivery with Zipline (Lockhart et al., 2021). In agriculture, Rwanda adopted national strategies for e-agriculture, establishing initiatives like ESoko+, a market price information system (Allassaf & Szalay, 2020), and entering Vision 2050, capitalizes on 'industry 4.0' technologies, such as robotics, the Internet of Things, and drones (Sylvère & D'amour, 2020). Further, Rwanda envisages to become a

regional hotspot on FinTech services. The country promotes demonetization through nationwide m-payment (mobile money), as an avenue to foster development, reduce poverty and increase financial inclusion amidst an inclusive cashless economy (Uwamariya & Loebbecke, 2020).

CHAPTER 4: METHODOLOGY

Social Research Strategy

The study engages with inductive reasoning. The objective is to *understand* what an African country (Rwanda) does to enable an ICT-based social innovation environment and how do they enable it (in what conditions). In short, generating theory rather than testing an existing theory through a hypothesis (Yilmaz, 2013). Still, the study's focus, objectives, and research questions derived from existing theoretical underpinnings. The theoretical framework is based on a series of key concepts, as outlined in Chapter 2. The "Social Innovation" concept was operationalized as the central reference to interpret the research observations.

The epistemological and ontological positions that guided knowledge and theory production are interpretivism and constructivism, respectively. Those assumptions reflect the principles of 'understanding' a situation rather than 'explaining' it. Interpretivism argues that knowledge and truth are subjective, culturally, and historically situated (Gemma, 2018), whilst constructionism asserts that social phenomena and their meanings emerge from constant revision by social actors (Bryman, 2016).

The study was based on a qualitative strategy, best fit to explore impact-driven ICT Innovation dynamics in Africa. A qualitative research strategy is "*concerned with subjective assessment of attitudes, opinions and behaviour. Research in such a situation is a function of researcher's insights and impressions*" (Kothari, 2004 p.6).

Research Design: Qualitative Case Study

The research adopted a cross-sectional, qualitative case study design which entails the vigorous and intensive analysis of complex phenomena within their context (Bryman, 2016). It will explore Rwanda's approach to create a social innovation ecosystem and an innovation culture. This will help to understand how the social innovation framework translates into formal planning strategies, and what are the enabling factors for social innovation in Africa.

Why Rwanda?

Rwanda was chosen as an exceptional case of African ICT-based social innovation, which is deviant from the norm and contains distinct features. Compared to its African counterparts, Rwanda presents distinct features: 1) Rwanda manages to plan ICT-based Social Innovation as a large-scale, state-led, formal practice; 2) Even though the country recently experienced the tragic 1994 genocide, ICT innovation has grown incrementally since the post-conflict transition; 3) The country has a complex socio-cultural context and macroeconomic particularities as a landlocked, resource-poor developing nation macroeconomic characteristics. Therefore, ICT Innovation serves as an optimal tool for contemporary Rwanda's development.

The study is exploratory. It investigates issues that have not been studied in-depth and delves into topics that were not anticipated during the research design.

Research Methods

The study takes a twofold design: First, a preparatory stage with qualitative document review on Rwandan policies and strategies, for background information; Second, semi-structured qualitative interviews with key stakeholders in Rwanda. The interviews were conducted online between January 2022 and August 2022, with interview participants based in Rwanda.

PART 1: Preparatory Document Analysis

Preliminarily, the study conducted a brief Qualitative Document Analysis (QDA), which is a method to analyze or evaluate the meaning of documents throughout the research process (Smulowitz, 2017). Rwanda’s ICT-based social Innovation is policy driven. Analyzing official policies and strategies outlined Rwanda’s high-level planning directions and objectives that foresee promoting social innovation. It laid out the groundwork to explore practical approaches.

QDA can suggest what questions shall be asked and outline what situations must be observed in the research. (Bowen, 2009; Wood, 2020). This stage was preparatory for the interviews, which is the data collection method that answers the research questions. QDA set the foundation of the interview guide, by providing background information, content and direction for steps that followed – the interviews. This research is not explicitly concerned with preliminary qualitative document analysis, but notes that such strategies were used to refine data collection.

The document selection was guided by the operational definition of Social Innovation in this study: “*ICT-based Innovative solutions whose primary goal is to tackle social challenges*” (Chapter 2). To reiterate, “Social innovation” is not established as a stand-alone policy domain. To investigate Rwanda’s social innovation planning, the study used a combination of policies in ICT4D and ICT Innovation, considering ICT-based social innovation as an integrated part within them. Therefore, four core documents were identified for their direct relevance to ICT-based social innovation, issued from 2015 onwards (Table below). The review was exploratory and open in scope. It identified elements concerning Rwanda’s practical approaches toward creating an enabling environment for social innovation. This was complemented by reviewing further sectoral and topical guidance, to track initiatives that deliver those objectives.

Documents	Issue Year	Implementation
Smart Rwanda 2020 Master Plan: Towards a Knowledge Based Society	2015 (MIYICT)	2016-2020
ICT Sector Strategic Plan: Towards Digital Enabled Economy	2017 (MITEC)	2018-2024
ICT Hub Strategy: Rwanda’s roadmap to becoming a leading ICT Hub in Africa	2019 (MITEC)	2019-2024
Science, Technology & Innovation Policy	2020 (NCST)	2020-2024

Overall, the process resulted into broad topics that summarized the government’s approaches, which are briefly summarized in Chapter 5. The process led to the creation of the Interview guide, which can be found in Appendix 1.

PART 2: Key Informant Interviews

The data collection method to answer the research questions was in-depth interviews with key informants. The preparatory document reviews outlined Rwanda’s high-level directions to promote social innovation and formulated the interview design. Once this step progressed, the interviews aimed to explore these elements, by integrating insights of individuals with first-hand experience and expertise in ICT-based social innovation in Rwanda.

Sampling Strategy

The sampling method for the interview participants relied on a combination of purposive and snowball sampling. The participants were selected based on multiple criteria, including currently operating in Rwanda or having operated in the past, involvement in ICT-driven innovation in Rwanda, level and field of expertise.

Considering the complexity and multidimensional nature of social innovation, the research invited participants with distinct profiles to explore diverse perspectives. The key informants were identified based on their type of experience in social innovation activities, and their affiliation to relevant entities or programs in Rwanda’s social innovation ecosystem. Accordingly, the study included key informants at two levels: ‘Experts’ and ‘Innovators’. Those reflect planning and implementation.

‘Experts’ included policymakers, stakeholders at ICT & Innovation institutions, the academia, hub managers, regulators, and individuals associated with major ICT4D programs in Rwanda and the region. ‘Innovators’ include entrepreneurs, project managers, and individuals delivering large-scale or small-scale social innovation initiatives in Rwanda. The participants were treated as a single group.

The sampling was primarily purposive, by interviewing a pre-defined set of key profiles, based on specific criteria (Bakkalbasioglu, 2020). The review of policies, official sources, public media reports, resulted in a long list of programs and organizations with a central role in ICT social innovation. Most participants were then identified through the professional social network “LinkedIn”. More than 200 contact-requests were sent to individuals with demonstratable background in the identified fields.

The sampling added a snowball dimension. After each interview, the informants were asked if they wish to provide contacts from their network that could potentially be relevant and

interested to have an interview. This helps to include hard-to-reach or hard-to-involve populations-(Baltar & Brunet Icard, 2012), which was the case for online interviews.

The participants recruitment included: 1) contacting identified profiles on LinkedIn with a short introduction on the project; 2) providing the concept note with a summary of study objectives, and the interview approach; 3) Conducting introductory calls through WhatsApp or similar apps to explain the research in a direct conversation, answer questions about the research to confirm their interest to participate; 4) scheduling the online interview.

Before the interviews, the participants received the ‘Information Note and Participation Consent’. The information sheet was developed after consulting Norwegian Centre for Research Data (NSD), and addressed personal data processing, confidentiality, and ethical consideration (available in Appendix 2).

In total, 19 interviews were conducted, out of which 18 were usable due to transcription challenges. Each interview lasted approximately 1,5-2 hours. Interviews were conducted via Zoom software, or similar alternatives like Microsoft Teams. The interviews were voice-recorded upon explicitly asking informants’ permission.

The final 18 interviewees had diverse organizational affiliations, roles, level of experience and fields of expertise. The participants had different age, gender, and education levels. Most informants were based Rwanda’s capital city, Kigali (15/18).

Categorizing participants’ profiles was not clear cut. Most informants had experience in social innovation through parallel capacities. For example, informants with start-ups were also affiliated to academia. Therefore, categorization would be misleading. Each informant adhered to one or more of the categories in the Table below. The most represented categories were International Development Agencies, and innovation hubs. The Government and the Public sector were least represented (2 informants with relevant experience), because contacting those profiles was challenging. There was no representative of investment firms, financial institutions, or multinational companies.

- Government Agency and Public Sector
- Start-ups or Entrepreneurial ventures
- International Development Agency, International Civil Society and INGOs
- Local Civil Society, Third Sector (local NGOs, non-profits)
- Academia (Private and Public Tertiary Educational Institutions)
- Intermediary Organizations (Hubs, Labs, Accelerators, Incubators, ESOs)
- Private Sector & Industry (SMEs, company)
- Independent Innovators (initiatives without organizational affiliation, informal sector)

Semi-Structured Interviews

The study conducted 19 semi-structured individual interviews with key informants. The first interview was a pilot, but was included in the analysis, due to the rich data and the informant's unique profile. One audio file could not be transcribed, resulting in 18 usable interviews.

The interview guide was developed following the preparatory document analysis but was continuously readjusted. It contained a core set of topics and themes to be explored in all interviews. However, all interviews were responsive and tailor-made to each informant's profile. This customization aimed to elaborate on their specific expertise. Creating tailor-made interviews involved meticulous design. During the introductory WhatsApp calls the respondents were asked to elaborate on their experience and expertise. Sequentially, some tentative topics was prepared for the interviews. The core version of the interview guide can be found in the Appendix 1.

The objective was to have an open discussion that would allow the informant to guide the process through first-hand experience, while minimizing the risk to impose preconceived ideas and assumptions on Rwanda's context. Semi-structured interviews leave room to follow the informants' direction in their responses, and touch upon topics that fall outside of the interview guide. Such interview type helps to get a more in-depth, uninterrupted account of the informant's insights and perceptions (Brinkmann, 2020).

The interview guide was continuously adjusted as new questions were added, reformulated, or removed, to explore new topics and themes that emerged ad hoc. The questions were open-ended, with numerous probing and follow-up questions. Open-ended questions help to generate thick description, through "*meaningful prompts that generate complex, nuanced thoughts and descriptions of the phenomenon of interest.*" (Bearman, 2020 p.4).

The informants were invited to provide recommendations on issues they considered important but were not covered during the interview. This ensured the relevance of the research and raise its trustworthiness.

Data Analysis

Each interview was audio-recorded on a computer, and then gradually transcribed. The interviews were transcribed verbatim, which allowed to perform a comprehensive analysis from lengthy discussions (1,5-2 hours each).

One summary sheet was developed during each interview that organized the discussion into manageable themes, noting key insights and issues for need further investigation. The summary registered initial observations and helped to obtain an overview of the saturated elements or what is pending to explore throughout the data collection.

The interview transcripts were used to conduct thematic analysis, by applying open coding to produce themes and categories. Thematic analysis is a flexible qualitative method which allows the interpretation of rich data. Researchers “*examine, organize, and present qualitative data/texts, maintaining the qualitative nature of the text*” (Thomas, 2020 p.148). The analysis aligned to the research’s exploratory nature and inductive reasoning, where themes derive from data without preconceived theoretical frameworks (Nowell et al., 2017).

To ensure trustworthiness and consistency, the study adapted the six-stage process proposed by Braun & Clarke (2006): Step 1: Become familiar with the data, Step 2: Generate initial codes, Step 3: Search for themes, Step 4: Review themes, Step 5: Define themes, Step 6: Write-up. The transcription was followed by reviewing the summary sheets, research logs and external information to get an overview of the dataset. This process generated pre-codes by noting keywords of interest to the Research Questions that outlined the first coding framework, which was then revised and refined systematically. These codes were grouped into categories of common meanings, which were classified into themes of recurrent patterns, trends, and regularities.

To manage the large data volume, the Thematic Analysis was conducted with the MAXQDA software, a non-cloud-based application for qualitative and mixed-method research. Researchers may use MAXQDA for its integrated user interface that manages diverse data forms, with functions as visualization, comparing data sets, making tailored/built-in analysis tools among others (Kuckartz & Rädiker, 2021).

Limitations

The study’s overriding limitation concerns the constant changes in the research design and timeline. The study initially intended to conduct field research in Rwanda. However, following the Covid-19 travel restrictions, field research was revoked. The research was re-formulated as a desktop research based on document analysis, which was again reconsidered due to limited available sources, until the final design with online interviews. More, due to various practical difficulties, the study was discontinued, and then resumed but prolonged. This prolongment was addressed with thorough updates to catch up with the constant technological developments in Rwanda (new policies, programs, and initiatives). However, these changes impacted the study’s coherence and cohesion.

Furthermore, conducting web-based research remotely during a pandemic, over a country the researcher has not visited, implies data limitations. This modality reduced the capacity to network with individuals or organizations and obtain information. It also reduced the understanding of the topical and socio-cultural context in Rwanda. Moreover, remote interviews affected the rapport with informants. Possibly, the online means hindered the level of detail the participants disclosed. However, this bottleneck was balanced by opting for a video conferencing platform and introductory calls, and the researcher’s long engagement with the study topic.

Another limitation relates to the informants sampling size and method. For feasibility reasons, the sample could not be larger. While targeting diversity, it proved hard to secure the participation of individuals in key roles, like governmental or public entities. Including those experts would allow to integrate insights on high-level planning in more depth.

Quality Assessment: Trustworthiness & Rigor

Credibility concerns how feasible it is to reach the conclusions of the study. The central limitation relates to the subjective interpretation of the Rwandan socio-cultural context and the topical, as a novice researcher conducting desktop-based research. The study would have benefitted tremendously from field research with “prolonged engagement” on-site and persistent observation (Nowell et al., 2017). One practice to promote credibility is through the various processes of triangulation or by involving participants (Stahl & King, 2020). Triangulation included substantiating statements with different participants to reduce biases and combining primary and secondary sources (documents and semi-structured interviews). For member-checking, some participants were contacted after the interview for clarifications in the transcription and to confirm findings. More, all conversations were voice-recorded and could be re-visited to evaluate the research and make a self-assessment after data collection (Eryilmaz, 2022). The findings credibility was also affected by the sampling method. The participants were mainly chosen purposively based on their experience in Rwandan ICT-based social innovation. However, there was no representative of government or public entities. This was substantially balanced by recruiting participants that worked in government programs and by reviewing government policies.

Transferability relates to the possibility to replicate the study. Qualitative research does not aim to generalize findings to a wider population, but findings shall be interchangeable (Bryman, 2016). Rwanda is an exceptional case that differs from its African counterparts in many levels. Nevertheless, some patterns of the Rwandan case can be transferred to other African innovation ecosystems, or population segments and economic sectors. The study included a “thick description”, by disclosing a detailed portrayal of the data collection, analysis and contextual circumstances that occurred throughout the research process (Stahl & King, 2020). This allows the reader to interpret whether the research can be transferable to other contexts (Nowell et al., 2017; Bryman, 2016).

Dependability requires tracking and logging the study stages (Bryman, 2016). The study’s timeline and research design were subject to constant changes like the switch from field research and desktop research and the study’s prolongment. Such inconsistencies should be addressed through meticulous audit trails, that provided evidence on the study’s methodological and theoretical choices and their rationale (Burke, 2016; Cloutier & Ravasi, 2021). A research log documented the entire research process, entailing the changes that occurred and how they affected the study’s approach.

Confirmability assembles inter-subjectivity and neutrality, thus it concerns “*the degree to which the analysis process is influenced by the researcher*” (Chung et al., 2020 p. 3298). It requires the researchers to recognize potential biases and their own positionality that may impact the study (Bryman, 2016). Doing online research about a country the researcher has no prior first-hand experience inevitably influences the interpretation of the informants’ experiences. The researcher’s positionality derives from a ‘Western’ context and possesses specific ideas on the role of technological innovation in bringing social benefit. The research tried to remain impartial in the discussions and in treating textual data, by using a reflexive journal and by disclosing to the participants the personal background and perceptions that may unintentionally impact the process. On top, the study is grounded on constructivist ontology that recognizes that reality is socially constructed (Kamal, 2019). This informed data collection and analysis by allowing the participants to lead the process, with open discussions where they would identify the key areas of focus.

Research Ethics

Although the study’s topic is not sensitive, the research had to comply with ethical obligations. Lune & Berg (2017), referred to two sets of ethical concerns: 1) whether people suffer from poor research practices, which reflect issues of harm, consent, privacy, and data confidentiality; 2) overall professional conduct regarding honesty, integrity, and responsible data reporting. Both dimensions were accounted for in this study.

Before data collection, the project was registered with the Norwegian Centre for Research Data (NSD), to review and assess the research’s personal data protection and processing and deemed in accordance with the data protection legislation. By consulting NSD, an information sheet was developed. It explained the research purpose, and what informants’ participation involves. It explained the voluntary nature of their participation, how personal data will be processed and stored and addressed confidentiality, and anonymity. This document was the basis to acquire participants informed consent. The thorough explanation of the research process and the terminology separates subtle research ethics to explicit ethics (Pascoe Leahy, 2022)

All participants were informed about the research concept note and the information sheet before the interview. Upon opening the interview, participants were asked whether they needed clarifications. Informants then orally agreed to participate. The informed consent was audio recorded upon permission.

CHAPTER 5: RWANDA’S ICT4D POLICY CONTEXT

In 2000 Rwanda adopted the Vision 2020 with an explicit objective to become a knowledge-based, middle-income country by 2020. ICT constituted a cross-cutting force to drive socio-economic development.

Pillars of the VISION 2020	Cross-cutting areas of VISION 2020
1. Good governance and a capable state	1. Gender equality
2. Human resource development and a knowledge-based economy	
3. A private sector-led economy	2. Protection of environment & sustainable natural resource management
4. Infrastructure development	
5. Productive and Market Oriented Agriculture	
6. Regional and International Economic integration.	3. Science and technology, including ICT

Table 1 Rwanda's VISION 2020 (Source: Republic of Rwanda, 2012, adapted)

Starting in 2000, Rwanda launched its national ICT strategy, through a sequence of 5-year National Information and Communication Infrastructure plans (NICI). NICI I-III focused on Liberalization, Access, and Services, respectively. The 4th generation, the Smart Rwanda Master Plan 2016-2020, guided Rwanda’s digital transformation into a knowledge-based economy and elaborated flagship initiatives to address key socioeconomic priorities through tech. SRMP’s initiatives rely on private sector participation, and the public-private partnership model (PPP). The ICT PPP model will reduce financial burden, stabilize investment efficiency and the projects’ success. The Plan cites Vision 2020: *“The Government of Rwanda will not be involved in providing services and products that can be delivered more efficiently by the private sector[...] the State will only act as a catalyst”*(MYICT, 2015 p.30).

Issued in 2017, the Digital Talent Policy planned to increase the ICT sector’s skills supply, to raise digital literacy and to attract the diaspora and foreign ICT talent. It envisaged to transform Rwanda from an ICT consumer/importer to a regional ICT producer/exporter (MYICT, 2017a). Those efforts coincide with the ‘ICT in Education Policy’ which aimed to raise access and quality in education by utilizing ICT (MINEDUC, 2016).

In support to the National Strategy for Transformation, the ICT Sector Strategic Plan 2018-2024, envisages *“to help Rwanda’s Economic transformation, social transformation, and Transformational Governance while becoming the “Leading ICT Hub in Africa.”* (MITEC, 2017p.14). The strategy’s specific objectives include securing universal broadband by 2024 as a basic need for Rwandans, inclusive digital literacy and government digital transformation towards effective government-business-citizens interactions. Selectively, the ICT-SSP outcomes include operationalizing the Kigali Innovation City, creating a Rwandan hub network, promote “Made in Rwanda” tech, Smart Cities and Villages, developing Fintech solutions with SMEs and *“support entrepreneurship & creation of Rwandan tech solutions to African problems”*(p.18). The Plan recognized challenges with limited human resources, low

ICT awareness, the regional competition between African ICT Hubs and the slow growth of skilled ICT professionals, among others.

Other informative sectoral strategies include the Education Sector Strategic Plan 2018-2024 which aims to strengthen STEM sciences at all levels of education in relevance to market needs, invest in technical and vocational education and raise “*innovative and responsive research and development in relation to community challenges*” (MINEDUC, 2017p.16). The Private Sector Development and Youth Employment Strategy 2018-2024 (MINICOM, 2017) underscores youth tech-based entrepreneurship and designs interventions to promote technology, innovation, standards and high-growth entrepreneurship, and to incentivize investment as a “*Proof of Concept Country*”. (p.68) where innovative ideas can be tested and fined tuned.

Similarly, the Entrepreneurship Development Policy (EDS) 2020-2024 underlines the role of technology start-ups and businesses in Rwanda’s entrepreneurial ecosystem and initiatives to support impact-driven business ventures. EDP identified mayor constraints in Rwanda’s entrepreneurship culture: “*the risk-averse attitude, entrepreneurship not well perceived, low acceptance of failure, and women, youth, and people living with disabilities do not always enjoy equal opportunities as entrepreneurs*” (MINICOM, 2020p.31). In response, it promotes local and international exchanges to cultivate an entrepreneurial culture, it ensures equal support for entrepreneurs, and it aims to increase awareness of entrepreneurship and access to finance through community-based mechanisms. It also enhances business entrepreneurship support systems through business consultants, mentors, incubators, and accelerators.

The ICT-Hub Strategy 2019-2024 is the main framework to achieve Rwanda’s aspiration to become an ICT Hub in Africa. The strategy plans interventions across three thematic areas: ensuring a skilled and educated workforce, inculcate a culture of innovation, and develop advanced technological capabilities and expertise in selected niche areas “*as a provider of practical, demand-driven ICT solutions*” i.e. data-driven farming, health informatics, digital finance, eGovernment services (MITEC, 2019). The Kigali Innovation City is the key establishment to incentivize innovation and synergies. Rwanda’s regional role will be

strengthened with the African Continental Free Trade Area, which accelerates technology diffusion, knowledge transfer and product exports (AUDA-NEPAD, 2021).

The Local Digital Content Promotion Strategy & Implementation Plan (2018-2024) asserts that the production, dissemination, and consumption of local digital content will power economic and social transformation. Locally made, context-relevant content in Kinyarwanda will decrease the digital divide and the rural



Figure 4 The ICT Hub Strategy (Source: MITEC, 2019 p.15)

population's marginalization and exclusion from the information society and will raise the global visibility and accessibility of Rwandan digital content. The plan adds "*local digital content is a formidable tool that Rwandans can use to tell their own story*" (MITEC, 2018p.9) as Africans must unshackle themselves from imperialism to tell their story to former colonizers.

The Science, Technology, and Innovation Policy creates an enabling ecosystem for research and innovation, establish citizen-centric and need-based programs, enhance multi-sectoral collaboration, and private sector engagement. It "*aims to contribute to demystifying research and innovation through addressing cultural attitudes and mindsets that may hinder performance.*"(NCST, 2020 p.10). Among others, it strengthens diaspora participation in R&D and promotes indigenous knowledge and local technologies.

Other relevant documents to this study include the Made in Rwanda Policy (2017-2024), which aims to address trade deficit the increase exports in value-added products "*towards services export, including in high-tech areas*" (MINICOM, 2017 p.40), the National Data Revolution Policy (MYICT, 2017b), or the National Cyber Security Policy (RoR, 2015). The National Broadband Policy and Strategy (MINICT-MINECOFIN, 2022) aims to upscale digital skills to increase citizen's value-perception for digital services and incentivize innovation. Recently, the government published the draft version of the Rwanda Fintech Policy 2022–2027 with the moto: "*Enabling a thriving fintech ecosystem -Positioning Rwanda as a fintech hub -Propelling the growth of the fintech industry*" (MINICT, 2022). FinTech is expected to address financial exclusion and boost entrepreneurship (Mader, 2022). At the time of writing, MINICT has been developing the Tech-Enabled Innovation Policy (TEIP), through multi-actor consultation and a policy Hackathon. TEIP "*identifies the most impactful needed reforms to unlock tech-enabled innovation and startup growth to transition to a knowledge economy and calls for the development of a Startup Act to incentivize innovative high-growth firms.*" (MINICT, 2021).

The Vision 2050 stipulates "*emerging digital economies; cyber security services; professional and digital skills services covering various technology clusters; cashless innovation-friendly financial services; and regulatory and institutional frameworks to enable trade in services.*" (RISA, 2021 p.27). Notably, it gives guidance to excel in Research & Development, become a data-driven economy, to construct a future-proof education system with a pool of tech talent noting "*Rwanda will continue to be a proof-of-concept destination and a living laboratory for today and tomorrow's innovation and embrace both incremental innovation[...] This will require Rwanda to remain agile and open to new ideas, embracing change.*" (RoR, 2020 p.24).

Last, as part of its membership in the Smart Africa Alliance, Rwanda launched the Smart City Rwanda Master Plan, a blueprint for sustainable tech in Africa (SMART Africa, RoR, 2017).

CHAPTER 6: INTERVIEW FINDINGS

The research aimed to identify Rwanda's approaches to promote social innovation and understand the underlying conditions that enable social innovation to grow. This chapter introduces the findings that emerged in the analysis of the qualitative interviews with key informants in Rwanda.

Theme 1: Practical Initiatives to Promote Social Innovation

Local & Regional Events

Hanga Pitch Festival is a nation-wide pitching event organized by MINICT and the Rwanda Development Board. The competition selects the top-five ideas on ICT Innovation and funds them to scale. The winning teams focus on government priorities like agriculture, health or education. Through Hanga Pitch Fest, the government identifies grassroots projects and supports or adopts them for public service provision. RS18 described: *“the selected ones are highlighted and can even be used to the national scale.[...]Hanga Pitch Fest is one of the newly developed ways of doing that because it goes through all corners of the country.”*

Face-The-Gorillas is an ICT competition where young entrepreneurs pitch their project to the investors. It is supported by the government. It includes multiple pitching phases during the year, happening through mass media, social media and selected events like the Transform Africa Summit. The Summit is Smart Africa's flagship event, and *“enables having people together and discuss what's the benefits of their people. That's one of the great initiatives that supports social innovation.”* (RS16).

Youth Connekt is another platform where Rwandan innovators manifest their projects, create synergies and network. RS3 estimated an 80% of them classify as ICT based social innovation. The winning teams receive prizes, and the government mediates to reach out to investors. Interviewees explained that via Youth Connekt, the Rwandan government identifies and partners with business ventures with potential for public benefit. For instance, the Tap-and-Go e-mobility application was a start-up that competed in YouthKonnekt and then joined Rwanda's official transportation system as a Public-Private-Partnership. RS9 explained that Youth Connekt is decentralized level in each administrative sector and province and finalists compete nationally. RS18 underlines how youth meet with key figures in the country and engage in strategic discussions.

Youth Connekt scaled into **YouthConnekt Africa** which emphasizes continental knowledge sharing. RS15 noted: *“if you're hearing that there is someone who has done something in Ghana for example. And you find that it's a good thing that you can also implement here in Rwanda.”* For RS14, Youth Connekt is a symbol for collaboration among youth in the Great Lakes. It facilitates dialogue between youth and decision-makers, in African countries facing

similar challenges: *“Having young people to come together through forums like YouthConnekt, and having policymakers exchange ideas[...] is enhancing the knowledge creation and the innovative approaches to creating social change leaders.”*

Some respondents mentioned **Miss Geek Rwanda**, a competition for tech and business ideas backed by Girls in ICT. RS17 said that the government uses the platform to select powerful projects and invest in them. Miss Geek Rwanda encourages female university or TVET students to utilize technology to address the populations’ challenges.

Campaigns & Programs

Connect Rwanda Campaign is a smartphone distribution campaign initiated by the Rwandan government. It runs as a *Challenge* open for the entire population to participate, through pledging phones voluntarily. Interviewees described positively how vastly organizations and individuals support with pledges. Many interviewees had personally contributed to the campaign. RS3 described: *“his excellence Paul Kagame has paid 1500 smartphones from his pocket. This is amazing. That time I said, why can't I pay 5 smartphones to the people?”*. The Campaign distributes smartphones to people who cannot afford them, mainly vulnerable rural households. RS1 highlighted that those devices customize data consumption costs ‘*according to social class*’. More, the smartphones are distributed strategically to people that do *“tremendous work in their communities”* (RS3). The government targeted priority geographic areas and individuals with key responsibilities like village leaders, health advisors, educators.

The campaign encouraged people to browse online, access social and financial services: *“people having bank account, you see transactions increasing, bilateral relations must be increasing.”*(RS6). Many respondents linked the campaign to increased innovation and entrepreneurial activity as it can *“make people starting using their phones for reaching daily goals automatically[...]help people connect and share information on businesses”*(RS4). Nevertheless, it is still early to assess results: *“There's still some journey to go, to make citizens feel familiar with technology, feel interested with technology”* (RS17)

Universities integrate innovation centers that run programs including accelerators, science clubs, incubators, simulations, or hackathons. Students ideate, develop products and get business mentorship. They organize events for students’ solutions which are commonly backed by donors, the private sector or acting agencies, e.g. Rwanda Innovation Challenge, an inter-university competition or ALU’s hackathon with the Rwandan national cyber security agency. RS17 recalls successful innovators and government officials visiting universities to incentivize students to *“solve people’s different problems”*. Primary or secondary schools also include **Innovation facilities** which are customized to children’s differentiated needs *“where the roots of innovation come”* (RS16).

Digital Ambassador Program (DAP) or “Intore mu Ikoranabuhanga (e-Ntore)” is an ICT Awareness campaign that rotates across Rwanda’s rural districts. DAP sensitizes citizens to

optimize ICT usage to their personalized needs. The program delivers training to youth, women, and vulnerable groups. The main objective is skills development. According to RS3, it focuses on ICT skills at a 70% and business skills at 30%. DAP stimulate use of e-government services, like Irembo platform, HealthTech or FinTech. RS17 recalled: “*The citizens were very, very happy to know that they will no longer have to take journey to walk to different offices.*”. The government agency RISA deploys youth with entrepreneurial background throughout Rwanda. These Ambassadors train and mobilize their own communities about the role of technology in local language, employing context-relevant approaches. Ambassadors join village gatherings, introduce ICT innovations, and encourage children to attend TVET. RS5 stated that the program explicitly uses the term “Social Innovators”.

UMUGANDA is an indigenous community gathering happening the last Saturday of each month. It is one of Rwanda’s Homegrown solutions. Rwandans do voluntary community work, and then hold a meeting to discuss community issues. Informants explained that during the follow-up meetings, the government agents communicate IC objectives, and introduce ICT initiatives, e.g. Irembo platform. The government cabinet gets citizens’ feedback. R9 described: “*the concept of seeing our technology and the digitalization has been changing.[...]People even before colonialism, used to do a Umuganda. [...]the government has to hear what the population needs and implement accordingly*”. Those meetings help people “*understand what is social innovation and the how they can use ICT for development.*”(RS11). RS14 explained Umuganda reinforces the problem-solving mindset.

IMIHIGU is another indigenous concept that some respondents mentioned to exemplify policymakers’ engagement with communities in planning social innovation. Politicians pitch their objectives, which are followed by yearly evaluations at every district. The government awards the top-3 districts with best performance.

Decentralized Promotion: The Rwandan government promotes social innovation across secondary cities, provinces, and districts. In essence “*in Rwanda everything is decentralized. Whatever the president communicates or the ministry communicate, it goes bottom-up*” (RS15). The Ministry of ICT & Innovation deploys an ICT representative at each governance level who mobilizes public engagement in ICT Innovation. RS11 described that local authorities collaborate with non-state actors on public outreach.

Chief Digital Officers were mentioned by only one participant, but the input is illuminating. Priority ministries in Rwanda appoint a CDO who oversees digital inclusion, development, and transformation, e.g. Ministry of Agriculture, Environment or Health. CDOs promote the digital agenda: “*we will be champion. I'm saying Ist through the next five years.*” (RS6). They ‘mediate’ between these ministries and MINICT, with affiliated agencies. e.g. Rwandan cyber–Security Agency, Rwandan Space agency, and help them understand how innovation initiatives fit their objectives. CDOs locate ICT-based ventures and back them up for specific causes, e.g. the Ministry of Agriculture hosts agri-tech start-ups.

Diaspora Initiatives: “Rwandan day” is the flagship event for the Rwandan diaspora, held yearly in different countries Rwandans living abroad convene to network, meet officials and

representatives of Rwandan culture, economy, and society. Rwandan Day introduces the country's socio-economic context, and available opportunities to engage in the country's development. President Kagame meets directly with diaspora: *"Rwandans meet president and he shares the vision. He even encourages them to come back and work together with other local citizens"*(RS16)

Media Tools & Publicity

Social media reinforce the *"buzz around social innovation"*(RS7). President Kagame is named the "Digital President" for his online activity. There is good storytelling around success stories of entrepreneurs and the ecosystem that drive inspiration. RS12 described how social innovation manifests in Twitter, Instagram, or YouTube. Traditional media -TV and radio-broadcast programs on entrepreneurship and encourage Rwandans to join the data sector. They communicate innovation strategies and opportunities within ICT. Respondents emphasized the radio for its strong influence: *"There's this statistic. I think it was probably 2015 that Rwandese will believe 80% of things said on the radio. Because radio has been something since even the 1990's, it was quite a big thing for Rwandese."* (RS18).

Internationally, Rwanda brands itself as an ICT hotspot. RS8 emphasized that Rwanda possesses excellent self-marketing capabilities on the international stage, adding that Rwanda looks for flagship projects that *"will make it to international news headlines"*, e.g. the covid-19 responses with robots, adding that to some extent, Rwanda pursues hi-tech innovation like crypto, satellite- solutions or blockchain to secure attention from donors, investors and financial institutions like the World Bank.

Infrastructure for Social Innovation

Youth Friendly Centers are open to youth to use computer labs and sharpen digital skills. Youth explore the webspace and familiarize with entrepreneurship. This is *"the highest motivation you can give people."*(RS3). **Telecenters** are public spaces to use ICT devices for personal and professional development in every Rwandan district.

kLab & FabLab have full endorsement by the government and the ICT Chamber. Both serve like incubators and training centers based in Kigali. kLab focuses on programming and coding to *"turn their idea into ICT-based solutions and products"*(RS13). FabLab is a space for manufacturing hardware and electronics that works on Internet of Things, 3D printing, machine learning, etc. kLab organizes workshops and networking events with experts on social innovation *"It has been very challenging for us to understand what 'social entrepreneur' means, and 'social innovation'[...]that's why it was required to bring experts in the field."*(RS12)

Hanga Hubs are replicas of kLab and FabLab for secondary cities. RS6 described that they provide machines for digital fabrication and laptops, cultivate soft skills and support computer programming. HANGA Hubs demonstrate that *“most of the services that innovators were getting from Kigali, they can also have the same from rural places.”*(RS16). Japan’s JICA supported the first batch of hubs and the European Union will take over.

Innovation infrastructure beyond Kigali: All respondents coincided in that Kigali attracts most innovators, however many supported that services gradually decentralize: *“the government is trying to anchor out the second cities, to link different infrastructures in the second cities, to support the private sector”*(RS15). Those respondents clarified that rural facilities are customized to local realities.

The Rwanda Coding Academy trains recruits exceptional talents in software programming, to utilize coding expertise for the country’s benefit. RS5 described: *“they recruit outstanding young people who’re showing a potential to become ICT elites. At a certain extent, they are given all the support they need [...] to become an asset for the country, for the economy.”*

SMART AFRICA is a high-level forum of African Heads of State that designs and coordinates smart investments for socio-economic development. President Kagame established SMART Africa with his own initiative and Kigali hosts the Headquarters. For RS9, Smart Africa influences the way *‘we see Rwanda’*. RS13 described: *“this pride of having “Smart-Africa” here in Kigali, will push Rwanda to do whatever needed to become ICT hub in Africa”*. SMART Africa contributes to social innovation through high-level directions. It operates on “high record label” or “high business label”(RS18). Its initiatives trigger the involvement of international players and tech giants, human capital and infrastructure development that will *“shape the future here”*(RS16). Some participants could not see the relevance of Smart Africa’s guidance in their activities, e.g. *“the local stakeholders or practitioners, they have no idea how these blueprints fit into their work.”* (RS6).

African Centers of Excellence: Rwanda hosts numerous Centers of Excellence (COE) with continental outreach. Examples include the African Institute for Mathematical Sciences, East Africa COE in Biomedical Engineering and E-health, the African Centers of Excellence in Internet of Things and in Data Sciences. COEs create young leaders that stimulate the regional innovation dynamics. RS2 claimed: *“there’s the Fourth industrial Revolution Centre in Rwanda[...]which should bring more awareness, on how social impact can actually take advantage of advanced technology.”*. COEs disseminate skills, expertise, and talent from Rwanda to the world. RS16 sees a global benefit as the talent that is trained in Rwanda turn in Silicon Valley or European markets.

Kigali Innovation City (KIC) is a technology and innovation open-space cluster in Kigali. KIC was launched during the interviews, and only a few informants had engaged in it. Most interviewees described it as an ambitious project for Rwanda’s social innovation. Interestingly, KIC competes with other African Innovation Cities. KIC locates top-tier academia, leading technology companies, investment firms, entrepreneurship intermediaries. It relies on “design thinking”, bringing infrastructure, incentives, and key actors to interact in a common stage.

RS18 gave the example of BionTech mRNA vaccine facility, being set-up next to the East Africa Centre of Excellence in Biomedical Engineering and E-health. KIC facilitates R&D, foreign Investment or Public-Private Partnerships. RS9 noted that KIC's priorities are social: Health-Tech, Agritech, FinTech. KIC is the physical gateway for incoming investment: *"if I go to Silicon Valley[...] I need an entry gate to get started with everything in the ecosystem there. That's what KIC is trying to achieve."*(RS16). However, some informants clarified that there is no public involvement.

Private-Public Partnerships

Public-Private Partnerships (PPP) are fundamental for Rwanda's social innovation. PPP is a financing model for 'heavy' initiatives that are less attractive to investors:

"look at the SpaceX, Elon Musk- was founded by NASA.[...]the public-private partnership is a new financing model in the economy. Not only on impact/social businesses; but also, research-based and probably, other heavy initiative[s] which are less attractive to investors who already have another alternative that is less risky and more profitable." (RS2).

For informants PPPs show the ecosystem's ability to work in synergy to increase social innovation's impact. Governments *"give market access to any company that is going to provide the solution they need and to implement their agenda"*(RS16). The private sector designs sustainable business models and the government adjust policies to accommodate impactful initiatives. Many informants claimed that the government approaches the private sector as the key player in innovation and 'provides the field'.

Rwanda as a "Proof of Concept"

Rwanda gradually positions itself as a "proof-of-concept" destination, offering various advantages for the "test-and-learn" phase of business models. Kigali is named "testing city"(RS7) for how well incentivized it is. Rwanda has a small market with low purchasing power. However, the informants stated that innovation actors choose Rwanda for the conducive business climate, with diversified facilities, financial incentives and flexible regulation that other African countries do not dispose. International businesses come to experiment, do market studies and secure stability and sustainability. As RS7 summarized, business experts can build their portfolio, start-ups can test their and create partnerships in a joint space, and youth get incentivized taxation for their first business ventures.

Rwanda has a very young ecosystem with less competition, and ample space for experimentation: *"a "baby ecosystem" is attractive because you feel like there are more opportunities. Because there is more room for exploration, room for innovation; you can do*

whatever you want, you can test, and then you can scale your business and new ideas, after Kigali.” (RS7).

Rwanda takes significant risks to test the feasibility of ventures, and scale incoming solutions that can contribute to development. Informants described Rwanda as a pioneer, welcoming interventions like satellite internet, drone-led social services, and remote sensing in agriculture. Many informants mentioned Zipline the American company that chose Rwanda to launch drone operations for blood delivery as Rwanda offered flexible policy regulation for drones in healthcare.

Capacity-Building

Tech talent development & Business Development: Numerous local training organizations deliver tech talent development programs, ran by private entities, or NGOs. RS6 stated that those programs nurture skills to cover the industry needs for deep tech, e.g. in Artificial Intelligence or IoT. RS18 underscored that training organizations fill the gap in tech talent development, as Academic institutions admit a limited number. Also, the ecosystem offers business development programs that *“incubate technically feasible projects and turn them into desirable products which are relevant to the market and can turn into viable businesses”*(RS6). Such training is enabled by the private sector and the government, mainly the National Council for Science and Technology or Hubs.

Entrepreneurship Courses in Formal Education: Rwanda revised the educational curriculum to integrate entrepreneurship courses at all educational levels. RS18 explained that pre-teenagers start their exposure to entrepreneurship environment: *“coming in as a young probably preteenager into secondary and I realized they're talking about this thing called entrepreneurship -proprietorship, joint ventures, creating business plans”*. Secondary schools offer specialization between technical courses or STEM sciences, and student apply their entrepreneurial skills in their specialization fields.

Universities also integrate entrepreneurship courses across all disciplines, which are combined to innovation facilities and programs in the campus like accelerators, hackathons, business simulations. RS9 described about high school *“I had to study a lot like biology, chemistry, physics, math, geography, history, but also entrepreneurship.”* continuing *“I was doing a bachelor’s in science, but entrepreneurship was additional.”*

TVET Schools & Rwanda Polytechnic Institute: Rwanda invests in Technical Vocational Education and Training as an affordable education option. RS17 noted that TVET Schools are established in all provinces, which gives hope for social innovation to arise in rural areas. TVET curriculum includes entrepreneurship and ICT- training in any technical specialization. Also, Rwanda established Integrated Rwandan Polytechnic Colleges that run short-cycle programs and *“sustainable training, short training programs to the young people in our country around social innovation.”*(RS12)

Theme 2: Enabling factors for Social Innovation in Rwanda

Social & Cultural Factors

Importantly, 17 interviews raised that Rwandan cultural traits influence social innovation, through values of community contribution, togetherness, and collaboration. Informants used diverse descriptions: a “*culture of trying to solve our own problem*” (RS2); “*in our culture, we are connected, collaborative*”(RS9); “*Rwandan culture is based on unity and working together.*” (RS10). R8 described:

“[it is] rooted also in the Rwanda culture... it’s a very group-based, collectivistic culture, say coming from very tribalistic cultures, where people just look out for each other. They don’t only pursue their own good, but they look for the greater good of the community, of family, of friends”

Rwanda’s young and growing population enables “*creativity around social order*” (RS7). Youth are more familiar with technology and better educated than older generations. RS5 reminded that the ICT ministry was designated as Ministry of Youth & ICT showing that technology and Youth are interrelated priorities: “*you can’t talk about innovation without talking about the young people. You can’t talk about innovation without talking about ICT.*”

Compared to African countries which have numerous ethnic or tribal tongues, Rwanda has one indigenous language. Kinyarwanda “*is a source of unity*” (RS1) that helps to educate, to provide real-time information, and to communicate. Nevertheless, people’s limited knowledge of English or French – official ‘colonial languages’ - is restrictive (Theme 5).

Most informants claimed that the government’s investment in specialized training and education disseminates expertise across the local ecosystem. Also, with cross-border activity people are “*bringing these skills from other ecosystems to our ecosystem.*” (RS7).

Additionally, for half of the informants, Rwanda’s quality of life indirectly aids social innovation, considering the high security, quality healthcare, inclusive education or the clean environment. This attracts foreign investors and “*enables someone to settle and innovate for the community because the people are already there to hear and to consume a service.*” (RS16).

Political Will & Public Governance

Without exception, interviewees underlined the government’s active support to social innovation. For most interviewees, the government is the strongest driving force, as it explicitly promotes digitalization, innovation, entrepreneurship, and investment to ICT. For example: “*there is the commitment there is the seriousness of institutions to support the people for that*

culture of ICT based social innovation” (RS15). Political will is strong, and the government creates market access to impactful solutions: “the culture is going and the government is very open to that. Anything that can transform lives and make impact”(RS1). President Kagame, the “Digital President” is personally involved in innovation activities. RS16 explained that the president is an example “how he serves his people, the people of Africa, people globally. That's where it starts, and then the culture spreads.”. However, the government sometimes moves “too fast for the corporate, or the social entrepreneurship sectors to catch up”(RS8).

All 18 interviewees appreciated that Rwanda’s policies and regulations create a favorable ecosystem. The government promotes the ICT objectives consistently. RS16 reflected *“if you want people to join you and develop together[...]we have to own the vision of the country”*. Many informants framed policies as a shared commitment. Indicatively, Rwanda aims to reach nearly-universal broadband coverage: *“if they are setting this goal by 2024 -I'm not sure if we will achieve this- but as long as we have set this goal, we have to act toward that goal” (RS13).*

Overall, Rwanda’s governance model facilitates innovation management, e.g. *“accountability plays a big role. And also, we know we don't have much alternatives than actually making it happen. I don't know much about other countries.[...]Rwanda is the one leading by example through execution.” (RS2).*

Macroeconomic Environment

All 18 interviews underscored the central role of ICT innovation in Rwanda’s socio-economic development. Most of them also mentioned the National Vision.

“The Rwandan Vision, is built on building a knowledge-based economy. There is no way you can build a knowledge-based economy without ICT. That brings ICT to the core[...]by solving our own problem, in our own context. We believe that there are available other markets on the continent who are looking at the same solutions.”(RS2)

Most participants supported that ICT addresses Rwanda’s macroeconomic characteristics: a tiny, central African, resource-poor, landlocked country with limited human resources and production factors. Illustratively:

“innovation is that natural resource that we don’t have[...] innovation is no savior, but it’s a very good driver for the economy of Rwanda to really propel.[...]we have very good success stories, in Singapore, etc. I think the innovation mindset around here is that it’s possible to find solutions that can work for us. And, be given to other people to expand and scale.”(RS7)

ICT was historically used to rebuild the country after the genocide, which influences ICT’s role today. RS13 described: *“Rwanda was determined to become a knowledge-based economy”* and prioritized digital literacy. RS9 explained that this shaped how people see innovation today.

Some respondents emphasized that Rwanda is a developing country, and technological growth creates business opportunities, e.g., *“being a developing country means there is a lot of problems to tackle from a social perspective. Meeting energy, education, agriculture, transport etc. There's a lot of business opportunities that innovators take advantage of”* (RS14). Some participants spotlighted social innovation’s potential to balance economic relations. RS13 claimed that social innovation allows Rwanda to focus on local priorities as there is *“still a gap”* where the country needs to *“follow the way”* of European former colonizers.

Geopolitical Factors

For 1/4th of the respondents, regional economic integration helps Rwanda’s social innovation to scale its impact and market reach. R8 explained: *“Your market is limited. And the accessible market is often only in Kigali.[...] this is where I think regional integration would help. And, if, maybe not Kenya, because of its role over all the other East African countries, but maybe Uganda, Tanzania and Burundi for example -they allow for more openness of such innovations, not just copy-paste.”* Two respondents indicated the Africa Continental Free Trade Agreement, which will raise competition, allowing Rwanda to *“export technology solutions, creating social impact, not only for our population but also at the continent”*(RS2).

Technology, Investment & Hard Infrastructure

Financing for social innovation offers new funding schemes like “net loans” for early-stage businesses to access seed capital, and equity fee loans: *“these financial enablers that actually become our business development partners and this drives a lot of people to actually start their own businesses”*(RS6). The government provides policy incentives to funders. The Rwandan Innovation Fund, the Business Development Fund and other institutions facilitate funding.

Social innovation funders in Rwanda are mostly donors, not investors. RS14 described: *“we are talking about grant funding not loans or equity investments”* and *“the value for money from a donor perspective lies around the social impact for most of them[.]we want to see that money not impacting one person, but this huge community.[...]social innovators can do that. Easily”*. The funding modalities recently shifted towards locally sourced solutions. RS7 unveiled that in the past, money was handed over to organizations, but now the focus has switched to enabling to more sustainable ways to strengthen the society.

Many participants mentioned that internet connectivity increased tremendously, and *“reaching everyone everywhere enables good implementation of social innovation”* (RS16). The government improved tech infrastructure, with fiber-optics and 4G networks. The higher (feature) phone ownership and (urban) digital literacy also help the use of technology.

Digital services are widespread. The government “*integrated the ICT in the daily activities of the citizen.*”(RS3), so people familiarize with digital tools: “*people kind of get used in e-government and digital transformation by doing the everyday life with digital services.*” (RS8).

Supportive Innovation Ecosystem

The informants unanimously stated that Rwanda’s social innovation ecosystem is conducive. It offers diversified support innovators:

“it requires an entire village to raise a child, but it requires an entire ecosystem to support a social innovator. And the more the ecosystem grows, the more the social innovators will be getting ample support, diversified support”(RS5)

For most informants, the key ecosystem actors include the government, the private sector and international organizations: “*Those three are on the forefront that contribute a lot to social innovation.*”(RS6). Almost everyone emphasized the role of intermediaries, especially hubs. However, the ecosystem is centered in Kigali, and the countryside remains disconnected (Theme 5).

The participants described that the actors work in synergy, with various collaborations. The ecosystem is accepting, flexible and there is mentorship and openness. However, the actors have differentiated roles. RS5 referred to a ‘cascading structure’ where everyone is assigned a role: “*we all have a stake, and each and everyone -they know exactly where they belong in terms of supporting the move of the entire ecosystem*”. Some informants claim that ecosystem representatives participate in innovation planning “*whenever there is a national planning of the country vision, key players are involved*” (RS2).

Most interviews emphasized Rwanda’s conducive business environment and often referred to the World Bank ranking for ease of doing business. Rwanda brands this growing entrepreneurship climate: “*the government created a buzz around “you can start a business, you can run a business in Rwanda, you can learn the goods and bads of your business in Rwanda”, then it’s very attractive for people who want to actually start their start-up journey*”(RS7). The government creates policy incentives for businesses and provides flexible regulation. E.g. RS2 referred to “Sandbox Policy” which enabled to pilot an innovation without regulation constraint. Additionally, digital finance is quite advanced, with a huge mobile money penetration “*which is deliberately supported by the Rwandan government, they want to establish a cashless economy in a few years*” (RS8).

Rwanda’s Regional Role as ICT Hub

All informants coincided in that Rwanda’s vision to become the leading ICT Hub in Africa brings opportunities for social innovation. It is the “*best way to actually keep up with*

international standard, or even contributing to the international stage”(RS18). Becoming an ICT Hub brings “more support or income or effort on board and then this can be a good way for those innovators to grow.” (RS10). The government establishes key ICT Infrastructure and institutions like the Kigali Financial Center. Global innovation players come to Rwanda to build presence, like the Swedish Norssken East African Hub or Carnegie Mellon University. Those attract regional actors to engage in ICT social innovation. RS16 described Rwanda as a “junction where parameters will meet and spread in Africa and the world”, underlining the global benefit “When talents are brought here, they go and contribute to companies in Silicon Valley[...]to companies in Europe, Asia. We need to do this -to own this as a global community, not just specifically, certain countries owning the innovation system.”.

Local innovators can multiply their impact and profits by scaling to neighboring regions that face similar challenges. More, Rwanda will benefit from incoming talent, unlocking “*the opportunity for a young Nigerian who has a very nice innovation to scale his or her product in Rwanda”(RS14), whilst African innovators bring new approaches, expertise and know-how. Still, some interviewees were concerned about market competition: “it could be very hard to integrate the international actors and also the local startups”(RS6)*

Respondents were optimistic on Rwanda’s progress. Looking at Kenya and other more established ecosystems aspire to be Hubs RS8 explained “*They are on the right track, Rwanda has the right mindset in which direction to develop”*. Rwanda’s unique advantage is its location in the middle of Africa with more advanced facilities and favorable policies than regional countries as a ‘proof of concept’ destination. An expert described Rwanda as “land-linked”:

“There is a saying. That Rwanda is not landlocked, it's land-linked. That tells you what they mean by Rwanda being “land-linked”. The link comes from the network. The network means a lot of infrastructure. So that's its declaration of the hub-region. The philosophy Rwanda has, of not feeling pity -not feeling landlocked- but proudly land-linked; to give us more ownership of that technology happening in the region.” (RS2).

Theme 3: Rwanda’s Conducive Social Innovation Culture

Increasing Public Awareness and Engagement in Social Innovation

The informants unanimously stated that Rwandans increasingly adopt a positive mindset and actively engage in social innovation. Some experts described this atmosphere as “spirit”, a “buzz” and “the vibes” to capture the intense enthusiasm. RS7 referred to the place where you feel it is possible to innovate and get inspired: “*Success is visual [...]there is a very good storytelling around [...]I think there is the buzz, and the good story-telling around the success stories of entrepreneurs, the ecosystem, how it has grown [...]These are flagship initiatives that are actually driving the conversation” (RS7).* Many focused on the growing support to social innovators receive from their community.

Two-thirds of participants highlighted that the concept is new in the Rwandan context, but the scene evolves drastically: *“this is a new thing in our culture, this is a new thing in our head[...]there is a significant progress from the start where there was confusion of people around social innovation”* (RS12). Many highlighted that the term is not commonly used -even by actors directly involved in it- and is not incorporated in formal plans or activities. Indicatively: *“There are lots of projects and implementations that you can see clearly social innovation, though they are not named that way.”*(RS1). There is still confusion of what social innovation practices entail among the ecosystem actors. RS6 described: *“It's a growing ecosystem, but with a lot of hiccups in the way. Lots of challenges because it's so hard for people to understand these ICT-Based social innovation startups that are coming out or understand what their products especially going to do in the market?.”* Social innovation is often seen as economically unsustainable and risky to invest: *“they do not understand how you can prioritize in business structure, impact instead of profit.”*(RS12).

Characteristics of Social Innovation Culture

For many experts, the social innovation ecosystem actors increasingly embrace Homegrown Solutions, but social acceptance of local products is still low. Respondents exemplified this with the “Made in Rwanda” labeled products, e.g. *“It is a new champion campaign that has helped a lot of people understand that things can be made locally, but we have our history of being industrialized.”*(RS6). Many experts considered that national ownership of social innovation is important. They referred to strong high-level efforts to promote local innovation: *“the government, the universities- are trying to emphasize on finding the solution that'll be homegrown, that is locally made rather than adopting the innovation from Western countries, or USA, or American”*(RS11)

The Rwandan innovation culture emphasizes community engagement and contribution, which reflects the broader society values. This aspect was consistent in all 18 interviews. For example: *“Rwanda has a culture of working together supporting each other[...]everyone needs to be the hero in reaching others to success”*(RS10). Similarly, all interviewees supported underscored collaboration and synergies, as ecosystem the actors complement each other and create joint projects.

The innovation culture is marked by alignment to the development agenda. RS5 affirmed that Rwandans get involved in reinforcing the national plans: *“There is, now, this behavior that's now, expanding and we see -what I can call- everyone getting the buy-in to support the political agenda, for the country to become the hub.”* This was re-iterated across most interviews.

Motivation Factors for Social Innovation

All interviewees stated social impact as the primary motivation for people to engage in social innovation, e.g.: *“that was the motivation. To build something that can solve problems in the*

city and in Rwanda and hopefully well outside Rwanda.”(RS18). Many prioritize social benefit over generating profit: “many people really choose that social part of their business ventures deliberately, knowing this might not be the most profitable thing to do, but it’s meaningful.”(RS8). A participant asserted “I’m not a businessperson, I’m a change maker” (RS10). Similarly, 17/18 interviews mentioned commitment with their community as a crucial motivation. Innovators aspire to create solutions because they have first-hand experience with hardships or must respond to an urgent necessity: “people facing problems with electricity, or water access, or agriculture.[..]an emerging problem that needs an emerging solution”(RS7).

Innovators also generate social innovations to contribute to national priorities:

“That goes with national priorities. Being independent individual doesn't discourage you or separate you from the country. The country, when supporting with resources, anyone who is a smart also has to align their vision to the national priorities, and, that creates a lot of motivation, creates a lot of opportunities”(RS2)

Two thirds of respondents emphasized that the numerous available opportunities incentivize people to join the ecosystem, e.g. “many start-ups are involved in social innovation -it is because there is opportunities offered by government, private investors”(RS11). Half of the respondents stated that securing a revenue stream is a driver but insisted that financial benefits are not imperative. For RS14, some see social innovations opportunistically as a process to make profit and face poverty, while others “are really into changing lives. For hitting the double bottom line profits.”

Theme 4: Mapping Rwanda’s Social Innovation Ecosystem

The Rwandan Government

All experts supported that the State is the leading actor in Rwanda’s ecosystem, focusing on high-level planning. RS3 explained that the government guides social innovation toward selected priorities in the market. The government provides critical infrastructure, attracts investment, and creates market access to promising innovations. It reinforces synergies with private sector or international organizations to implement social innovation and promotes social innovation through mobilization and capacity-building programs. Government stakeholders come “on the ground seeing what's happening being part of the campaigns.”(RS6). Nevertheless, others see “little interaction with what happens every day. Because they just regulate the whole space.” (RS7). Primarily, ICT Innovation and investment are driven by the Rwandan Development Board.

International Organizations & Local Third Sector

According to 16/18 interviews, international organizations are major players in social innovation. They consist of development agencies, INGOs or foundations. Often, foreign governments establish a formal entity in Rwanda through their international development arm, e.g. the DiGiCenter links to the German GIZ.

The international organizations, elaborate the ecosystem. RS2, the private sector is the face, implementing project, but development agencies invest and elaborate programs. They establish capacity-building programs, set innovation spaces, and contribute with collaborative research or product development. International organizations *“come up with the money or the experts to make sure that what the government said can be implemented on the right scale.”*(RS11). International organizations are the main funders in Rwanda’s ecosystem and ‘replace’ investors: *“like every ecosystem in the world, Silicon Valley as well; they only work because they have this functioning way, where they have developing partners that are helping them. There it’s like venture capitalist, but here, we will say it like GIZ, USAID.”*(RS7). International organizations must partner with local civil society, who in turn collaborates with the local private sector, for sustainability *“if you create a solution and the next morning you close your office and you go? You will create more problems than the one you find here”*(RS2).

The local civil society has minimal involvement in social innovation. Rwandan SCOs have limited funding, so technology is not financially viable: *“that’s an expensive sport where even a civil society can contribute like 0.0%.”*(RS13). However, local NGOs have a unique understanding of the populations’ challenges and offer practical, technical or low-cost solutions. RS8 compared them to INGOs: *“you sometimes work with assumptions that you believe are so valid because you have experiences out of spare[...]However, the local NGOs really have the expertise, really know what are the challenges of the people -and, oftentimes more pragmatic solutions”* Local SCOs indirectly assist the diffusion of social innovation to uneducated, vulnerable or remote communities, and *“change the mindset of the community that they can live in the digital world.”*(RS9).

Private Sector & Start-Ups

According to informants, the private sector executes and implements social impact projects, in partnership with the government and NGOs. It supports capacity-building, provides capital and entrepreneurial infrastructure. Some firms organize events, e.g. hackathons or competitions that identify innovations and strengthen it. RS7 explained that the Rwandan private sector is new in the ‘social’ context of the ecosystem, and still not actively involved. Private organizations are not willing to invest in social innovation because there are more profitable businesses: *“they wanted to start with “Rwanda as a new country” from the tragedy. Now, they have a very solid investment. [...]you find other business opportunities that the financier is more interested in than the idea of social impact.”*(RS2). Nonetheless, Corporate Social Responsibility are increasing.

The Private Sector Federation's ICT Chamber mediates with international actors and aids the creation of associations, e.g. in FinTech. It facilitates innovators to benchmark their presence. RS3 described iHuzo, a platform that hosts tech innovations across diverse fields to create synergies and raise their social accountability.

All 18 interviewees underlined the strategic partnership between the government and the private sector in social innovation. RS2 stated that the government is trying to do a key move on providing the field to the private sector, fund them for follow-up or for investing to reduce their losses and then move back. Similarly, for RS4 the government supports the market so that it leads social innovation.

Notably, ICT solutions are predominantly delivered by start-ups: *"they're now the route everyone is trying to use for implementing the concept social innovation"* (RS5). Further, *"most of the recent and upcoming start-ups are mainly focusing on social innovation"* (RS12). The informants recognized the start-ups' potential to tackle techno-social challenges and *"innovate for the industry and the 4th Industrial Revolution in Rwanda."* (RS10). The start-ups are *"key partners with the government. The government of the country depends on them."* (RS4). Start-ups can bring social impact because of their scalability. ICT helps them grow organically and replicates results faster than traditional business. RS5 argued that start-ups are mainly beneficiaries rather than contributors in the ecosystem.

Intermediaries: Hubs & Innovation Spaces

Rwanda hosts diverse intermediaries, predominately tech hubs and innovation centers that concentrate in Kigali, e.g. Impact Hub or Westerwelle Start Up Haus. They are at the forefront of social innovation: *"I call them powerhouses. They are home to lots of ideas. And lots of working prototypes."* (RS6). Hubs offer grace programs for ventures at all growth levels, mainly through incubation and acceleration services. Innovators cultivate technical competences and refine the solutions into feasible products with maximized impact. Most hubs work in general context, yet some specialize in one field, e.g. Norssken focuses on HealthTech. RS8 explained that many innovators have never heard of business management terms, so they get business advisory apart from just finance. Hubs organize events, like workshops or hackathons and networking opportunities to create synergies. Many experts mentioned that funders and government representatives join hubs to identify promising entrepreneurial solutions and propose partnerships. As RS4 stated: *"hubs become the key partner, the middle point where innovators meet with stakeholders or the investors"*. Hubs are interconnected through regional networks. e.g., AfriLabs.

Hubs are strongly oriented to social impact, often as explicit requirement. For instance: *"almost all the hubs-intermediaries have social innovation as a key element in their programs. So the recruitment looking for entrepreneurs with social impact, or who have the potential to create social impact, or, at the bare minimum, who don't have negative effects on the social landscape"*(RS14). Government-backed hubs are aligned to the national goals. RS13 explained

a hub would assess “*how my project is related to the country development, how my project is related to their goal*”. RS7 explained that hubs showcase their work to officials “*To validate the effort[...]that this is part of the agenda*”.

The Rwandan Diaspora

The Rwandan diaspora has influence and secures investment for social innovation. Illustratively: “*The diaspora is very influential. The Rwandan diaspora especially in Belgium[...]trying to appeal towards the government -and vice-versa. They are very affluent,[...]And do feel still a very strong commitment to Rwanda. They are a major source of finance for social entrepreneurship that are tackling social challenges. Especially when it relates to their own experience -from the genocide against the Tutsi*”(RS8). Increasingly, Rwandans born abroad return to benefit Rwanda with expertise and capital.

Informal Sector & Cooperatives

Only 3 interviewees mentioned the informal businesses as social innovation actors. Distinctly, RS16 stated there is nearly no informal sector in the field as the government regulates the space. Many independent ICT projects have great potential: “*you will be surprised you see someone who came up with a very good social impact solution, and they are never went looking for funds*. RS18 explained that the diffusion of Mobile Money (MoMo) in rural areas spurs innovation activity, as people get access to loans, digital services and financial services.

Cooperatives are a driver of socio-economic and digital change in the countryside. RS8 described “*everybody is always looking at the successful start-up owner -drinking cappuccino in a co-working space in Kigali and picturing this as the driver of social and economic change. But I would really go back to the cooperative business model, which is successful for over 200 years now.*” Cooperatives connect communities of common interests, where they “*get the basics that can allow them to go into the innovation field*” (RS18).

Academic Institutions

The Rwandan academia cultivates students’ mindset and aptitude towards entrepreneurship and technology. RS6 said that universities change the perspective of students from figuring ‘white-collar jobs’ to nurturing innovation that helps society. The university lifetime is crucial to ideate solutions and nurture skills. Rwandan universities have integrated entrepreneurship in their curriculum across all disciplines. RS8 explained: “*engineering students are not just been trained in engineering, through engineering internships, but they are offered different entrepreneurship trainings, they are doing internships in social organizations*”. Some universities host innovation facilities or programs, e.g. the Rwanda Innovation Challenge.

Most informants supported that universities are not involved in R&D for social innovation products. RS7 explained that academia is “*still under provisioning work force rather than what it's committed to be about -providing social innovation*”. RS11 added “*the conversion of research into a commercial application that it's become the challenge for the people.*” R&D activities remain under government agencies or industrial companies.

In contrast, international universities actively engage in social innovation. International academia came to the ecosystem recently, with the attraction of world class universities and African Centers of Excellence. RS7 stated they cultivate the ‘*leaders and entrepreneurs of tomorrow*’. They integrate R&D for social innovation, in cooperation with national and global stakeholders and industries. In African Leadership University, students create business models or even set-up start-ups within the campus. ALU runs the “Global Challenges” degree where students from across Africa work on social innovation planning for global pressing issues. Carnegie Mellon specializes on “*big projects which can make the social impact at the national level, or continent-level, or worldwide*” (RS12) in direct partnerships with decision-makers.

Theme 5: Challenges in Establishing Social Innovation and Scaling its Impact

Limitations in Human Resources were mentioned by participants as *the* primary challenge for innovators to drive complex tech-based solutions. Innovators cannot easily balance between tech-skills, business skills, soft skills, and applied knowledge in targeted social causes. They often lack basic ICT-skills, like website design or software development and it is hard to find people skilled in coding, advanced technology or deep tech. Most interviewees expressed that the available training cannot cover increasing needs, e.g.: “*the biggest GAP in the innovation ecosystem system is the skills or the talents, because the educational sector still lacks. You have a good idea but don't have people to drive it.*” (RS18). RS3 highlighted that innovators are often not aware of training opportunities, as they “*don't know where to look or what to look for.*”

Limited Financing: As Rwanda’s innovation ecosystem expands, there is competition over government funding: “*many people are trying to adapt or engage in a transition to the social innovation because of the opportunity around it, of course the government and other stakeholders can't subsidize everyone.*” (RS12). Chiefly, although slowly improving, investors are still unwilling to finance social impact solutions as they see no viable profits e.g., “*the private [sector] people are not willing to invest in social impact, because of a global concept about investment. People read capitalism[...]when you say, “social impact”, they think you're not more about generating profit*” (RS2).

RS9 stated that the cause one is targeting determines access to finance, because funders have distinct projections and financing conditions. More, RS7 explained that interventions outside Rwanda’s high-level priorities, have limited access to competitions, grants, and training.

Early-stage innovations require capital to prototype and test solutions, until they create viable, scalable, proven projects. However, funds for experimentation, practicing, or R&D are scarce. RS2 advocated for funding modalities allowing to “*do more mild exploration*” e.g. patient capital or seed capital.

Low adoption from the communities remains a huge impediment according to 3/4th of respondents. One reason concerns how communities perceive potential benefits from social innovation, when they use established technology. RS14 commented: “*the market also needs to have that reflection of change; we need to embrace new things*”. For RS11, users’ resistance derives from low awareness on ICT and its benefit especially rural areas. About 16/18 interviews mentioned that population segments remain uneducated, digitally illiterate with low connectivity, where “*You may introduce a very interesting project to people. Depending on their level of understanding; depending on their level of digital literacy, you are stuck from there[...]they don't even want to hear.*” (RS13).

Low-tech versus High-tech Innovation: the informants explained that Innovators who introduce high-tech initiatives face strong challenges to operate. Even simple digital tools cannot always meet the local reality with low smartphone penetration, digital illiteracy, and low broadband internet penetration. More, innovators increasingly think of sophisticated tools and deep tech (blockchain, IoT, cryptocurrency, or AI) that can only be received by distinct segments of the population of the population, e.g. “*if you want to implement cryptocurrency in a local village in Rwanda[...]they don't know even what cryptocurrency is. Always about timing, knowing exactly when the product is needed on the market.*”(RS9). Before tapping into those tools, innovators must “*reap the benefits of low-tech opportunities*”(RS8). For many respondents, basic tools like USSD codes or SMS could work better to bring impact. However, this is restricting to innovators. RS7 explained that low-tech tools prevent start-ups from scaling to other areas or create the ingenious innovations they aspire. RS8 explained that at large scale, Rwanda looks for flagship high-tech initiatives that “*make international headlines*” which can attract the funders’ attention. RS9 added that innovators must keep updating their initiatives to catch-up with the rapid technological change.

Long-Term Sustainability: Innovators must consider the solution’s lifetime and how far it can keep bringing the intended impact. RS2 explained that for long-term sustainability, innovators must examine “*the long-term integrated lifestyle*” and “*not isolate it*” from aspects of society, the community, alignment with partners, even demography and newly available tools. Similarly, RS7 emphasized the difficulty to combine business sustainability with bringing the social impact the project commits to.

Operating beyond Kigali: Most participants mentioned that Kigali’s centrality prevents social innovation to scale geographically. The innovation ecosystem outside the capital remains weak, with limited opportunities for practical support, e.g. scarce innovation hubs and a weak private sector. RS7 described: “*you step right out of the capital city, there is literally nothing happening around innovation. There are no hubs, there is no market for the social impact businesses. [...]The government is trying hard to decentralize that innovation culture, even - itself.*”. Rural populations are not familiar with the innovation space nor with technology itself:

“many of these innovations just don’t work with digitally illiterate people in the villages.”(RS8). Innovators are not incentivized to scale beyond Kigali because setting up operations is expensive given the experimentation, testing and adaptation needed.

Scaling beyond Rwanda: RS18 explained that local innovators cannot secure funding to stabilize or cannot go abroad to do the needed market studies to compete on the regional market. There are success stories of people starting in Rwanda, those often concern foreign initiatives: *“you look at the funders, they’re Rwandans, and the solution was not initially used or meant for the local market.”* (RS7). RS14 added that the regional distribution channels are problematic, putting entrepreneurs in situations without structures. This complicates taxation, business collaborations, and imposes “huge risks” in supply chain.

Language restrictions: Many informants emphasized that part of the population does not adopt ICT solutions because they cannot speak or read English (or French). ICT devices, especially smartphones, are not programmed in Kinyarwanda and local digital content is limited. Similarly, innovators who do not speak English have difficulties to access infrastructure and training opportunities. For example, RS18 explained that they cannot join discussion forums in Kigali. RS17 added that innovators must create initiatives in English to be able to scale abroad. RS13 explained this historically, as Rwanda transitioned between 2 colonial languages, shifting from French to English as the main official language (next to Kinyarwanda). This sudden change resulted in limited understanding of either language, as people’s learning process was interrupted.

Overestimating Technology: the benefits of tech-based practices can be over-estimated. RS2 explained: *“Technology is not a solution, it’s a tool. The better people understand that context, the more they find the right solution to the population who needs it”*. Similarly, RS1 underlined the risk in overlooking potential side-effects in (mis)using technology: *“We shouldn’t just give the phone to the people and say, OK, we brought technology and now you are out of the darkness. But then you don’t know what the person is going to do with the light. Will he use it to make the world better or to destroy more?”* RS1 referred to Rwanda’s genocide where the radio was used to promote hatred.

Measuring Impact is work-intensive and costly. Social innovators must ensure the solution brings the intended impact, especially when they have committed to funders. RS9 underlined that innovators shall provide accurate data and *“revise their model in case it’s not really working to the way it can be beneficial to the community.”* (RS9)

Market Competition: social innovators operate in narrow market margins. RS14 claimed start-ups cannot respond to funders requirements for market attraction. RS13 asserted that start-ups and SMEs occupy 98-97% of the private sector, indicating a high attrition rate for start-ups and SMEs. RS18 added that start-ups must convince about their impact without much traction.

Importing Innovation: there is duplication of regional trends and *“not always well-done”*(RS8). Customizing foreign solutions is common but must improve: *“There is much adaptive work to be done, and not standardized things. We shall consider the context and own*

realities in the society we want to implement the solution without assumptions. How do we really invent, reinvent the way and the context and everything to be able to keep going and not making it a kind of rule base and thinking what fit you will fit me or will fit somebody else.”(RS1).

CHAPTER 7: DISCUSSION & CONCLUSIONS

This research contributes to the knowledge gap around high-level planning of ICT-based social innovation, and the conditions that reinforce it in African innovation ecosystems. Specifically, it investigates how Rwanda successfully promotes social innovation and explains the overarching factors that enable it to grow. Through interviews with key informants in Rwanda, the research analyzed 1) high-level strategies and practical initiatives for public mobilization and capacity building that promote social innovation; 2) the underlying conditions that enable social innovation to advance in Rwanda, including Rwanda's broader socio-economic environment, the conducive characteristics of Rwanda's social innovation culture, and the roles of the innovation ecosystem actors; 3) challenges in establishing social innovation and scaling their impact. This chapter discusses Rwanda's social innovation dynamics based on how the interview findings relate to the literature and interprets their broader meaning for social innovation planning.

Rwanda's Practical Strategies to Promote Social Innovation: Following the Vision

The Rwandan government employs a wide range of practices to promote social innovation, expanding from media and publicity campaigns to capacity-building, awareness programs, strategic partnerships, and flagship infrastructure. Many of these practices are encountered in other ecosystems – either in Africa or the Global North, e.g., the global booming in digital innovation hubs (Jiménez & Zheng, 2021). Other initiatives are customized to local realities and specific societal needs, and some are clearly endogenous and embedded to Rwandan culture and lifestyle (e.g. Imihigu traditional practices). Therefore, knowledge-production processes find Rwandans “*between their locally generated and inbound ideas, instruments, and practices*” (Mavhunga, 2017 p.9).

Although the evidence is limited, Rwanda's mobilization campaigns seem strategically designed to generate a multiplier effect, e.g. the Connect Rwanda Campaign prioritized people in key roles in their communities. Most campaigns seem tailored to the differentiated needs of each population segment e.g. the Digital Ambassador Program using local language and community networks in rural areas. Interestingly, the government considers traditional practices as a platform for diffusion of innovation, e.g., using Umuganda community gathering to introduce ICT solutions. Globally, indigenous social institutions can facilitate effective innovation diffusion and technology adoption, e.g. Wedajo et al. (2019) looked at Ethiopia's Afoosha society. Rwandan home-grown initiatives are well-rooted in the governance and development system, implying community participation and national ownership (Odhiambo, 2020; Hasselskog, 2020; McNamee, 2021). Those cannot be replicated per se but demonstrate how social innovation spreads organically through existing social systems that create common value, without alienating technology from the traditional way of living.

Rwanda hosts local and regional events that drive the conversation around social innovation with a dual benefit: They offer exposure and growth opportunities to innovators, but also

enhance knowledge sharing and structured dialogue between innovation stakeholders e.g., the Smart Africa's Face the Gorilla, Hanga Pitch Fest or Miss Geek Rwanda. Notably, big events take advantage of existing infrastructure and know-how. Hosting large-scale, regional, events harmonize with Rwanda's strong investment in MICE tourism (Meetings, Incentives, Conferences, Exhibitions) (RoR, 2020).

The media have a strong power to engage wide audiences in social innovation dynamics. There is good storytelling with decisive narratives on the emancipatory process of entrepreneurship. Measuring activity and impact improves the legitimacy and visibility of social innovation (Reynolds et al., 2017). Chiefly, Rwanda's self-marketing capabilities, demonstrate the government's "*inordinately*" success in disseminating and persuading citizens toward this ICT-focused vision, and in reinforcing a unique mindset for ICT-led social contribution (Kano, 2021). The Rwandan leadership celebrates championship in ICT Innovation, demonstrating achievements to "*drive the conversation*" (RS7). Many respondents mentioned international rankings, or recognitions to illustrate the country's accomplishments in ICT4D, something that "benchmarks" Rwanda as a success story (Nsengimana, 2017; Baguma & Finquelievich, 2021). Accordingly, Rwanda's flagship initiatives make it to international headlines. These are high-tech initiatives –like crypto or robotics- and attract donors and investors' attention.

Looking at the interviews in their entirety, Rwanda offers a very wide range of capacity-building and training platforms, confirming the need for "*investments into opportunity structures*" (Lukesch et al., 2020 p.7). Those are primarily physical spaces for generic or specialized use, e.g., technology centers, hubs, and other innovation-inducing nodes. Rwanda's diverse landscape follows the proliferation of 'intermediaries', with various Entrepreneurship Support Organizations and innovation centers that sensitize social innovation across Africa (Burns, 2021; Littlewood, 2022; Dosso et al., 2021). Besides the recent expansion of training structures to the countryside (e.g., Hanga Hubs, TVET), Kigali remains the pole of innovation facilities.

Although formal education seems limited to background work, Rwanda's curriculum appreciates the interdependence of social and technical innovation components (Bataglin & Kruglianskas, 2022; Rothe, 2022) which can unlock social innovation (e.g., integrating entrepreneurship and ICT courses at all disciplines and all education levels). Distinctly, Rwanda invests in some state-of-the-art facilities that target 'ICT Elites' and exceptional talent, with an explicit goal to work on regional innovative solutions e.g., the Rwanda Coding Academy or the African Center of Excellence in Internet of Things. The pan-African reach of those institutions builds on Rwanda's plan to become a hotspot for demand-driven expertise (Shava, 2022). Importantly, taken together, Rwanda's pro-ICT policy places equal importance to soft infrastructure to hard infrastructure (Aubert, 2018), showing that expertise and knowledge can be far more decisive to the ecosystem than plain funding (Domanski, 2018).

The Kigali Innovation City (KIC) parallels the rise of "social silicon valleys" (Mulgan et al., 2021). This specialized facility confirms how design thinking plays out in 'shaping' conditions for social innovation. Numerous African countries invested in 'smart cities' or 'technopoles' e.g. Wakanda in Ethiopia, Hope City in Ghana, Konza City in Kenya (Mkalama & Ndemo,

2020; Arku et al., 2022; Pollio & Cirolia, 2022). Yet, those efforts are not always successful. Projects like KIC are often seen with doubt for their neoliberal, start-up centric approach to development gains (Olajide & Lawanson, 2022). Others question whether a Silicon Valley-ish model is appropriate for the non-traditional sites of African innovation (Marchant, 2018; Bandauko & Arku, 2022). KIC's strategic proposition will only be understood in the long term, as the project is not yet mature. Nevertheless, the project seems oriented to sustainable and social innovation, which could be a better-fit scenario for Rwanda's socio-economic particularities (De Falco, 2022).

Private-Public partnerships are a central tool for social innovation to grow, which reflects the governments 'ultra-market-friendly' approach (Gaudreault & Bodolica, 2022). For the informants, the rationale behind those collaborations lies with optimizing results and minimizing risk. Such statements echo the official narrative: "*the Government of Rwanda will not be involved in providing services and products that can be delivered more efficiently by the private sector*" (MYICT, 2015 p.30). This partnership model demonstrates the inherent multi-level interactions and cross-sector partnerships that leverage each other's resources and competences, through cross-fertilization, experimentation and lateral thinking (Pache et al., 2022; Wascher, 2021).

In this regard, the Rwandan government has established systems to identify local start-ups with potential for social impact and scales them, often through public-private partnerships. Synthesizing from the participants' responses, this approach is evident in government-affiliated hubs, or pitching events (Youth Connect Africa, Hanga Pitch Fest, Rwanda Innovation Challenge, etc). This element was not encountered in the literature as an analytical basis but opens up many possibilities to explore how such systems operate.

Rwanda transforms into a "proof of concept destination" (PoC), becoming a testbed where tech ventures can practice, experiment and scale. The main justification for this approach lies with bringing solutions of social value to Rwanda – in short, social innovation. Rwanda's flexible regulation can unlock opportunities for disruptive innovation with potential to benefit society, e.g. Zipline introduced drones-based blood delivery by choosing Rwanda as a PoC (Lockhart et al., 2021), which is an example of how "*an entrant's innovation first gains a foothold in a niche market*" (Petzold et al., 2019 p.158). Like a participant mentioned, Rwanda's "baby ecosystem" is more attractive than saturated advanced environments, which implies that the PoC model is not a quick-fix for any market. Rwanda's openness to innovation and experimentation toward impactful ventures contrast the conventional view about social innovation and social entrepreneurship policies that "*tend to be rather conservative in both risk-taking and uncertainty management*" (Pinto et al., 2021 p.66).

The Enabling Factors for Rwanda's Social Innovation: How Context Matters

The interviews mapped down a wide range of conditions that directly or indirectly create a conducive environment for social innovation in Rwanda. This confirms that social innovation

can be highly context sensitive (Vercher et al., 2021; Ardil, 2022). The results showed social innovation is predominantly favored by political will, the supportive and diversified ecosystem, Rwandan culture, and the role of ICT in Rwanda's socio-historical context. Mapping down those elements contributes to the knowledge gap around the emergent catalysts and the processes where social innovation occurs (Chueri & Araujo, 2018). The informants' feedback delineates the complex individual, organizational and environmental factors involved in efforts to promote social innovation (Lekhanya, 2019). Taken together, Rwanda's dynamics in social innovation are mainly attributed to strong policy frameworks, developed networks in the ecosystem and supportive structures for knowledge and skills sharing. These dimensions are the 'softer elements' of the ecosystem, which often lag (Pulford, 2011).

African cultural values affect innovation and entrepreneurship behavior (Abubakre et al., 2021; Igwe & Icha-Ituma, 2020). Accordingly, Rwanda's social innovation reflects cultural and indigenous traits, being a collectivistic society that values togetherness and unity. Some experts see that Rwanda's tragic history with the 1994 genocide defined the role ICT has taken for the country's development till present, influencing how people perceive innovation's potential. Some linked ICT to a drive to achieve national goals. Although the statements are anecdotal, they indicate that social memory and historical background feed into how a country responds to social innovation (Ravazzoli & Valero, 2020). Overall, Rwanda's history is an example that the transition into a knowledge-based society is not a one-dimensional process that occurs equally around the globe (Stehr, 2018; Choong & Leung, 2022). This calls for a deeper understanding of the history and culture as determinants in innovation planning.

As expected, demographics, and particularly Rwanda's young and fast-growing population enables "creativity around social order"(RS7) and smooth diffusion of innovation and digitization. While this concerns the entire continent (Frimousse, 2019), the Rwandan population has an exceptionally youthful age structure with young people constituting three-quarters of the population. Youth entrepreneurship comes to respond to the pressuring need for growth and development in Rwanda (Blimpo & Pugatch, 2021), This is seen in respondents' expectations around the start-up's contribution to society. What is unique in Rwanda is how youth and ICT were considered interrelated priorities from high level, e.g. with the designation of the Ministry of Youth and ICT.

Language was an interesting element, not encountered in earlier work on social innovation planning. From one side, Kinyarwanda, is the single indigenous language which helps information sharing, contrary to the region's multilingualism. Yet the 'colonial languages' English and French are not widely spoken, demonstrating a need for language-sensitive approaches (devices, local digital content, events). As articulated by the government "*local digital content is a formidable tool that Rwandans can use to tell their own story*" (MITEC, 2018p.9).

The growth and refinement of human capital accelerate innovators' capability to navigate through the opportunities presented to them, and transposes competencies across the social innovation ecosystem. In Rwanda, building human capital includes early familiarization with innovation (e.g. business courses from high school, ICT education from primary schools),

building a pipeline of digitally literate entrepreneurial workforce. This adds to Rwanda's overall quality of life, security, access to social services (Nagar, 2021). Those elements allow people to develop their potential and constitute fertile ground for investment (Baguma & Finquelievich, 2021; Cieřlik, 2022).

Rwanda's political will and supportive policies are determinant – hence the role of top-down, large-scale planning. Globally, attempts to manage social innovation through policy have proven difficult as 'social innovation policy' differs from traditional policy regimes (Krlev et al., 2020; Cipriani et al., 2021). Rwanda's example confirms that policy can play a central role in shaping the conditions for social innovation to emerge (Ravazzoli & Valero, 2020; Ozdemir & Gupta, 2021). The informants' references on different policy instruments and how those relate to their work outline a harmonized policy infrastructure, with many plans complementing each other to support the Vision (Yongabo & Göransson, 2022). This finding challenges the conventional view in research and practice that frames social innovation, and especially African innovation, as a bottom-up, highly contingent process (de Fátima Ferreiro et al., 2021). While scholars suggest that social innovation cannot be a deliberate, manageable process that happens in a vacuum (Avelino et al., 2020; Peterson et al., 2020), the recognition from field actors on the role of policy and the State's governance brings intriguing implications to whether and how social innovation can be regulated or even reinforced as a formal process in Africa.

Accordingly, the government's commitment to social innovation is an expected but important result. All experts underlined how the Rwandan government has adopted a clear stance in favor of social innovation which translates into constant practical support, promotion, and investment. Innovation and entrepreneurship are explicitly encouraged, parallel to setting a conducive environment, for business and technology (Yongabo, 2021; Shava 2022). Interestingly, these findings confirm the central features of the Rwandan State as depicted in the literature, a transformative leadership with a developmental vision (Biedermann, 2016). The experts' views on the Rwandan Vision as a guidance to their activities within social innovation, reveal how success derives from a clearly articulated development vision, based on quantitative measures (Nyenyezi Bisoka & Geens, 2021). Indeed, the informants stated that the government made it easier for citizens to familiarize themselves with its policies, and offered examples of how policies are communicated (e.g. Imihigu or Umuganda, radio campaigns etc.). The above aspects link back to how strongly ecosystem actors harmonize with the country's vision so that everyone "*gets a buy-in to support the political agenda*" (RS5). Accordingly, the ecosystem mapping revealed that actors align with the Vision's objectives, e.g., some hubs ask start-ups to explain their contribution to national goals.

The above correlate with Rwanda's good governance and accountability model (Nyoni & Bonga, 2019). The stable, functional institutions promote an investor-friendly climate and strengthen the private sector (Cieslik, 2022; Gaudreault & Bodolica, 2022). Rwanda's low corruption and overall security (Raphael & Komakech, 2020) are crucial determinants for investors to pick Rwanda as a 'testbed' for their innovation. Those 'preconditions' shall be

examined when evaluating a state's capabilities to design social innovation programs, considering the regional political instability.

The informants appeared very appreciative of ICT's role in Rwanda's socio-economic development, which 'brings more effort on board'(RS10) for social innovation. Their input resembles the rationale for opting ICT as a development tool in the "Rwandan Model" or "Miracle" (Gaudreault & Bodolica, 2022; Rwigema, 2022). Claims like "*it replaces the natural resources other countries have*" (RS7) explain that Rwanda's resource-scarcity and its landlocked, densely populated characteristics make ICT an optimal choice (Baguma & Finquelievich, 2021). More, such arguments reveal actors' expectations for ICT's leapfrogging potential and its 'revolutionary' effect (Umukoro, 2021; Dearden & Kleine, 2021). ICT4D is driven by the conviction that there is a causal relation between technological growth and social change or the ability to alleviate social concerns (Rothe et al., 2022). In this line, the interviewees expected that ICT can contribute to solving many problems at once. Interestingly, some experts urged to keep realistic expectations around ICT's benefit, stating that 'technology is a tool, it is not a solution' (RS2). Social innovation shall not be seen as a normative panacea (Pinto et al., 2021; Bragaglia, 2021). This relates to the broader need to recognize ICT's side-effects and inconsistencies and leave techno-optimist or techno-deterministic explanations (Schelenz & Pawelec, 2022; Dearden & Kleine, 2021; Rother & al., 2022).

As a developing nation, Rwanda, sees myriad of business opportunities in ICT, across key social spheres. Those arguments capture social innovation as a way to revitalize the Welfare System (Sinclair et al., 2018; Guerreiro & Pinto, 2021; Unceta, et al., 2020).

Interestingly, social innovation can contribute to balance power relations in economic and development planning, allowing Rwandans to define priorities to work on – thus, "*solve our own problems, in our own context*" (RS2). More, locally sourced innovation is an alternative to adopting overseas innovation, which repeats a common argument for African 'homegrown solutions (Rahim, 2017; Friederici et al., 2020).

The ever-increasing economic integration in East Africa eases up innovation processes. Considering Rwanda's landlocked particularities with a small market purchase power, the African Continental Free Trade Agreement will benefit Rwanda's exports of impact-driven ICT solutions (AUDA-NEPAD, 2021). At the time interviews were conducted, ACFTA was launched and ratified while continuing the negotiation processes with African States.

Rwanda has invested in physical infrastructure aiming to reach 'last mile connectivity', together with a wide range of specialized institutions to regulate innovation (e.g., Rwanda Innovation Fund) (Yangobo, 2021; Nwaka, 2021). Digital services are widespread which allows Rwandans to familiarize with digital tools (e.g. Irembo platform). While the informants recognized that Rwanda has advanced in digital innovation, they almost unanimously placed low internet access and smartphone ownership as the main challenges to scale social innovation –where 1/4th of the population is connected (Kemp, 2022). Overall, the participants recognize improvement and progress rather than a static state of 'excellence'.

The Investment modalities for social innovation illustrate that Rwandan government's capacity to regulate the innovation space through loans, flexible regulation and tailored financial incentives (e.g. sandbox policy, seed capital, etc). This, the State stimulates the supply and demand for innovations (Polman, 2019). The key funders in social innovation diversified, shifting away from handing-over money towards enabling local solutions. This reveals a more sustainable model than *"the common ICT4D approach of top-down or North-South delivery of ready-made equipment"* (Zhang et al., 2022 p.5) and thus a model that values local realities. Contrary to ecosystems in the Global North, which are dominated by investors (venture capitalists), funders in Rwanda are mainly donors. Donors are driven by impact, allowing social innovation to grow organically. This aspect may apply to many developing countries, possibly giving a boost to socially oriented initiatives.

Unsurprisingly, Rwanda's conducive business environment is a top enabler for any social innovation project. The government puts sustained efforts to attract investment, and to accelerate private sector development (Baguma & Finkelievich, 2021). The informants added Rwanda's advancement in digital finance (Fintech), to the picture. A cashless economy is said to boost financial inclusion and entrepreneurial growth in Africa (Uwamariya & Loebbecke, 2020). Most informants explained Rwanda's 'ease of doing business' through international indicators, e.g., World Bank reports. Those are well-known, but the interviews show how the government brands the country by celebrating championship (McNamee, 2021).

Rwanda set concrete plans to position herself as an African ICT hub (Baguma & Finkelievich, 2021). The ICT Hub vision brings myriads of opportunities for social innovation, accelerating capacity-building, international synergies, tech infrastructure development, R&D, and investment. Rwanda explicitly aims to produce and to export solutions that serve African countries with similar challenges. The participants confirmed that the government set priorities to develop national expertise in niche areas with social value, including Edtech, Fintech, e-governance, Healthtech and Agritech (MITEC, 2019), e.g. through the African Centers of Excellence or regional Events like YouthConnect. In essence, this offering *"from Rwanda to Africa and to the world"* depicts how reverse innovations diffuse from *"low-income customers to high-income ones, from developing countries to developed ones. However, before reaching the more developed countries, they diffuse through neighboring or distant countries with similar socioeconomic settings."* (Hossain, 2020 p.3). Those innovations challenge the status quo on innovation diffusion (Moradeyo, 2022). Rwanda's ICT Hub vision shall be analyzed within the broader regional context where African countries race to become tech hubs with expectations to bring socioeconomic and environmental transformation, e.g., Silicon Savannah, Silicon Cape, or Silicon Lagoon or Yaba Valley (de Falco, 2022; Pollio & Cirolia, 2022). Considering Rwanda's starting point at the 1994 genocide, Rwanda evolves faster than established ecosystems with stable start-up scenes. Nevertheless, the social value yield from those efforts will only be visible years ahead.

Rwanda's Social Innovation Culture in the African Innovation Paradigm

Early in the research process, it became evident that social innovation was relatively understudied in Rwanda, regardless of the country's strategic focus on tech innovation. To ensure coherence, Social Innovation was explicitly defined as "*ICT-based innovation whose primary goal is to solve social challenges*". Nevertheless, results should be taken with consciousness. The study confirmed that social innovation is an underutilized and misunderstood term in Rwanda. Ecosystem actors use it in dissimilar ways, and it is seldom mentioned in programs, policies or media. This observation supports that social innovation remains a contested, fragmented concept (Slee et al., 2021). The investors' (mis)perception on social tech-entrepreneurship as a financially unsustainable activity reveals the practical implications of the concept's ambiguity (Pinto et al., 2021; Foroudi et al., 2021).

Nevertheless, the growing excitement and support from large parts of the population, gradually formulates a vivid culture around social-impact-driven ICT-based solutions, encompassing knowledge-sharing, collaboration, and enthusiasm to innovate (Kassim, 2022). Synthesizing from the 18 discussions reveals a "work in progress". In essence, Rwanda undergoes a transformational journey to change the public mentality in favor of digital development and ICT. It will take time for Rwandans to embrace a "*tech-savvy, service-oriented, outward-looking, and linked strongly to East Africa*" identity that the government promotes as beneficial, especially in rural areas (McNamee, 2021p.387). Understanding the gradual shift in Rwandan people's mindset allows to interpret this study's findings as an ongoing process, with hiccups on the way, rather than a static conclusion on *what* works and *why*.

Rwanda's social innovation increasingly embraces local solutions, or "*solving our own problems, in our own context*", quoting an expert. The need for self-reliance echoes Rwanda's overall development model that emphasizes homegrown solutions in social processes (Hasselskog, 2020). The informants' arguments parallel the broader calls for endogenous innovation across Africa (Gupta & Karam, 2019; Němečková, 2021). The aims of the Rwandan government with promoting local innovation are strong and progressive, but Rwandans will need time to get accustomed.

The findings suggest that social innovators are motivated by a combination of push and pull factors. Predominantly, innovators are driven by their sense of community contribution, strive for social impact and national unity. Individualistic or personal benefits are secondary determinants. Their views outline an ideal-type social innovation whose aim is to "*generate social benefits rather than individual benefits bringing new values for society*" (Kim et al., 2021 p.19). Those responses indicate an exceptional attachment to community. These associative and cooperative elements stem from unique traits in Rwandan tradition, and demonstrate the need to study the cultural basis of innovation that extends into values of responsibility, engagement, and collaboration far from merely economic arguments (Terstiep et al., 2020).

One illuminating result is that innovators wish to contribute to national priorities and the political agenda through their projects. Rwandans' sense of affiliation to the country's

development can be interpreted in different, complex levels: Historically or culturally, economically, or through to the State's putative preference for "social engineering" (Takeuchi, 2019). Any of those would be an overgeneralization. The experts insights indicate that the country's vision creates a shared value consensus, and individual responsibility and personal commitment to the country's success where everyone "*gets a buy-in to support the political agenda*"(RS5). This comes at the essence of innovation culture, that is proactive, endogenous, holistic, long-term focused, driven by a strategic, systematic vision for purpose-making (Bass, 2022).

Rwanda's innovation culture possesses some central features seen in African innovation. Mainly, it is youth-driven and centered on entrepreneurship (Akanle & Omotayo, 2020). Nevertheless, Rwanda's innovation contrasts the region's predominantly bottom-up processes from Bottom of the Pyramid communities and the informal economy (Muthuri et al., 2021; Guma, 2021). Rwanda's innovations are rooted in a broader resource constraint environment (Rwanda), but the experts' descriptions fall far from what the typical "frugal", necessity-driven innovation (Ploeg et al., 2021). Instead, the participants delineated social innovation as a product of Kigali's middle-class communities, often university graduates with access to facilities, and largely neglected any sense of informality playing out. The culture is "*not based on R&D as is the case of industrialized countries, nor purely 'frugal' or 'inclusive' in nature*" (Fu, 2020 p.xvii).

Actors in Rwanda's Social Innovation Ecosystem: Diversified Support

The informants depicted a well-regulated, diversified, supportive, and collaborative social innovation ecosystem. It consists of a wide range of heterogenous actors, who work in synergy but have clearly defined, complementary roles in enabling social innovation. As an informant said, "*it requires a village to raise a child, but it requires a whole ecosystem to raise an entrepreneur*". These interrelations and interactions indicate the need to shift away from deductive agent-hero or entrepreneur-centric approaches toward a thorough understanding of how social innovation occurs as a systemic product (Pel et al., 2019).

In Rwanda's ecosystem, actors fall beyond the obvious. They often participate in hybrid forms and do not identify with the term social innovation or may be unaware that they engage in social innovation activities (Domanski, 2018). The experts outlined a quadric configuration of committed core actors, including the private sector, international organizations, and the government, together with a wide range of intermediaries. Many more actors participate directly or indirectly. Rwanda's ecosystem deviates from popular explanatory frameworks like the 'triple-helix model'— where the government, businesses and universities are leading actors (Morawska-Jancelewicz, 2022), or frameworks that incorporate "civil society" as a key actor (Cai & Lattu, 2022). In Rwanda's configuration, the universities and SCOs are indirect actors, that cultivate a general mindset around innovation, rather than producing tangible outputs.

The interviews confirmed that the leading actor in Rwanda's ecosystem is the State, that regulates the social innovation space through high-level planning. The government endeavors to create a conducive environment for ICT transformation and to foster a national culture of innovation (Mkrtchyan et al., 2020; Yongabo, 2021; Shava 2022). The Rwandan government is very open to collaboration, intervention, and experimentation, as seen by the willingness to position the country as an ICT Hub, to become a "proof of concept destination" or to securing private-public-partnerships. These approaches coincide with the characteristics of the "Entrepreneurial State" that takes risks, is proactive and manages uncertainty to address complex problems (Kattel et al., 2022). Some interviewees explained that 'the digital' President Kagame and government officials participate in the promotion campaigns, indicating that the governance system constitutes an exemplar of digital development.

The private sector executes or implements social innovation projects. Interestingly, the private sector will soon take the lead in social innovation. This finding can be analyzed through Rwanda's aims to become a market-driven economy, that strongly promotes self-employment (Ciešlik, 2022; Blimpo & Pugatch, 2021). Providing the field to the private sector to deliver social-public services can be seen as a form of compensatory "*caring liberalism*" (Pinto et al., 2021). In this line, start-ups are seen as catalyzers for socio-economic development and "*partners with the government*" (RS4). Contrary to centralized innovation structures, like Ethiopia, Rwanda's liberalized market can potentially unlock the actors' ability to innovate (Shkabatur et al., 2022)

Rwanda's ecosystem is dominated by diverse intermediaries, primarily innovation hubs, that run incubators, accelerators, and transnational networks. Hubs are in the frontline of social innovation as "powerhouses" (RS6) that produce socially and locally relevant innovation to address social problems (Kolade et al., 2021; Jiménez & Zheng, 2021). Given their role in capacity-building, they fill gap in skills needed for social innovation to grow. Hubs could be seen as alternative streams of research, innovation, and participatory knowledge production (Atiase et al., 2020). Distinctly, Rwanda's hubs, are closely aligned with the national agenda and -sometimes explicitly- focus on social innovation. Although hubs are a global configuration, they seem to integrate local with non-local knowledge to produce tangible innovations (Mwantimwa et al., 2021).

Chiefly, the interviewees ecosystem mapping unveiled the Rwandan civil society had minimal involvement in social innovation. This contrasts empirical evidence describing that social innovation typically emerges as a bottom-up, small-scale process led by the civil society (de Fátima Ferreira et al., 2021). Similarly, the informants' insights indicate that the informal sector is almost non-existent. This view may relate to the fact that most key informants were experiences professionals based and operating in Kigali's vibrant ecosystem, and thus far from the countryside where informal businesses are common. In either case, Rwanda's ecosystem differs from its African counterparts, which presents multi-level informality and self-taught practices (Jegade, 2020; Guma, 2021).

Notably, the Rwandan diaspora is a strong asset to shape the scene in social innovation, given their influence and attachment to their homeland. The interviews input on the diaspora is not

sufficient to understand how the governments engages them in the field, e.g. with the Rwandan Day.

Challenges in Establishing & Scaling Social Innovation: A work in Progress

The enabling conditions for social innovation in Rwanda should be juxtaposed with the remaining challenges in establishing and scaling social innovation, which predominately concern human resources, finance, and community adoption. Those challenges stem from a mix of cultural, financial, social and natural elements that affect innovators' ability to mobilize resources and the society's ability to utilize them (Ravazzoli & Valero, 2020). As in the entire research, any possible explanation would include 'it is a work in progress'.

Innovators face challenges in acquiring human resources and finance to support their ventures. As a result, people may have good ideas but no practical capacity to drive them. The interviewees showed that knowledge and expertise are equally or even more decisive than funding (Domanski, 2018).

Largely, social innovations are hampered by low adoption from communities. This demonstrates a failure to integrate local expertise and adaptive capabilities when establishing an ICT solution (Jimenez et al., 2022; Krauss, 2022). In essence, Rwandans are asked to embrace a new tech-savvy identity and engage in innovation (McNamee). This remains hard, especially for uneducated, digitally illiterate, or rural populations with little exposure to the innovation space. Low adoption adds to obstacles with limited connectivity and low device ownership. Hence, ICT can amplify disparities between the country's socio-economic groups (Rothe et al, 2022; Schelenz & Pawelec, 2022).

Apparently, the social innovation ecosystem draws a line between Kigali and the rest of the country in accessing, utilizing, and producing social innovations. This follows the regional urbanization trend in a question of opportunities (Frimousse, 2019). While the literature supports that congesting innovation and entrepreneurship in the African urban space "*only benefits the elite, transnational class and capital investors*" (Bandauko & Arku, 2022p.13), the informants were rather referring to middle-class, young entrepreneurs and start-ups taking advantage of Kigali's vibrant networking community and international exposure. In either case, most informants were based in Kigali, leaving little room for this research to explore how the scene evolves in the countryside. As Rwanda puts efforts to anchor out all 'opportunity structures' across provinces, e.g. with TVET, Hanga Hubs, future research would benefit from exploring than angle.

Although the informants were positive about ICT's potential for the Rwandan society, they recognized that ICT Innovation has limitations and incoherences (Rothe, 2022). The informants referred to complex contextual conditions that can limit ICTs potential to bring sustainable impact (Krauss, 2022; Schelenz & Pawelec, 2022). For instance, language barriers due to lack of digital content in Kinyarwanda. More, Rwandan communities have diverged perceptions

about the potential benefit from ICT innovation. In the bigger picture, this underlines the need for a comprehensive theory that problematizes development in the broader ICT4D field (Khene & Masiero, 2022).

Accordingly, the interviewees underlined the risk in overlooking technology's unintended consequences (Fougère & Meriläinen, 2021) when technology is not used properly. This demonstrates the need to accompany social innovation with advocacy.

An important issue that emerged from the interviews related to the dilemma's innovators face in choosing between low-tech and high-tech solutions. This decision goes beyond merely determining the optimal benefit or the ability to 'do more with less' (Radjou & Prabhu, 2015). Instead, the choice concerns complex factors around opportunities for funding, the ability to scale-up geographically and creative aspirations for more digitally sophisticated tools.

More, while Rwanda consistently promotes local innovation, there is still substantial duplication of regional trends. The need for better customization of those trends shows that scaling is not universally appropriate and social innovation cannot be replicated indiscriminately (Pittz & Intindola, 2022a; Deserti & Rizzo, 2020).

Conclusions & Recommendations

This study aimed to investigate how can ICT-based social innovation be reinforced through high-level planning in an African country. To do so, it selected Rwanda as an exceptional case that manages to promote social innovation through formal strategies. The study identified Rwanda's practical initiatives to strengthen social innovation and explored the underlying conditions that enable social innovation to advance.

Rwanda implements a wide range of programs to strengthen social innovation, focusing on adoption (users) and creation (innovators). Those programs reveal a complex interplay between global and local practices, often integrating cultural and traditional features. The government designed tailor-made engagement campaigns for key social groups, together with events and competition schemes that identify ideas with impact potential. More, Rwanda invested in entrepreneurship and innovation intermediaries that accelerate capacity building and generate tangible products. The formal education gradually transforms itself to create a pipeline of digital talents that will support the vision of a knowledge-based society. The ecosystem establishes flagship projects like the Kigali Innovation City, an ambitious 'Social Silicon Valley', and invites key innovation actors to build their presence. Rwanda's social innovation scene is new and requires time to mature and flourish. However, the strong investment and high-level openness reveal a booming tech and innovation sector. Rwanda's initiatives are not fixed-recipe and cannot be replicated indiscriminately. However, they can inform researchers and practitioners' understanding on existing practices in an African setting. As the study's scope was limited to Kigali, those interventions are more relevant to African urban communities.

As an imperative, Rwanda establishes her regional presence as an ICT hub in Africa, aiming to build regional tech expertise in niche areas, like HealthTech or AgriTech. Similarly, as a “Proof-of-Concept destination”, the country offers a testbed for innovation. When compared to similar endeavors across Africa, those strategies underline the ‘prerequisites’ of a friendly business climate and flexible policy to unlock social innovation’s continental reach.

Rwanda’s social innovation is influenced by complex micro and macro-level conditions, mainly the local culture, the role of ICT in Rwanda’s development as a resource-poor, landlocked country, the ease of doing business and the strong political will. Although those elements are specific to the Rwandan case, the mapping can be useful to understand the multiple contextual layers that influence innovation activity directly or indirectly, and what strategies could respond to those realities, as a customized process in innovation planning.

Rwanda’s social innovation ecosystem is collaborative and offers diversified support. The leading actor is the State, followed by international organizations, the private sector, and various intermediaries. There are multi-level synergies, including the strategic public-private-partnership model that follows the will to become a market-driven economy. Importantly, the government’s clear support to innovation and experimentation and its ability to regulate and incentivize the innovation space, are key enablers. This may differentiate Rwanda from its African counterparts with less favoring governance or policy infrastructure.

Rwanda’s innovation culture is growing rapidly, embracing strong associative and cooperative values and a quest to produce home-grown solutions. Innovators strive to create impact for their community or benefit the country, often seeing the national agenda as a shared purpose. This demonstrates the role of a clearly articulated national vision to bring a mindset shift in favor of ICT Innovation.

While the efforts to strengthen social innovation are strong and sustained, this is still a work in progress. Innovators face challenges in establishing social innovation and scaling its impact, which relate to human resources, finances, and low adoption. Those results could be useful for less established ecosystems that try to boost social innovation.

Recommendations for further Research

The research explored Rwanda’s strategies to promote social innovation. As high-level planning for social innovation is a largely understudied area, this thesis identifies issues for further investigation.

Considering the study’s data limitations, it is recommended to conduct a research in Rwanda with a larger sample of informants that would integrate policy-makers’ perspectives. A longitudinal approach would be helpful to understand how the different policy instruments and flagship interventions materialized and understanding of the outcomes. Also, a study in Rwanda’s countryside would unveil how social innovation manifests, and what are available support structures.

Future studies would benefit from a narrower focus, looking at specific tools that can potentially strengthen social innovation, especially the role of ‘technology cities’ or ‘ICT Hubs’ in the Global South. Considering that tech-cities are an emerging field, a comparative approach with other African cities would be useful, especially in the context of regional economic integration. Such research will benefit from new theoretical perspectives like postcolonial theory or glocalization theory.

Last, the challenges involved in establishing and scaling social innovation deserve more investigation, indicatively, the complex choice between high-tech or low-tech solutions.

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THE INTERVIEW GUIDE – BASIC STRUCTURE FOR INFORMANTS

Relevance of Social innovation to the Informant

For this discussion, social innovation will refer to “ICT-based innovation whose primary goal is to solve social challenges”. Based on this definition, in what ways do you find your work relevant to social innovation?

Enabling Factors for Social Innovation

Based on your experience, what direct or indirect conditions create a conducive environment for social innovation in Rwanda?

Innovation Ecosystem

What actors are involved in the ecosystem and what are their roles in enabling social innovation?

What kind of partnerships do you think are crucial in reinforcing social innovation?

Social Innovation Culture

How would you describe the culture around ICT-based social innovation in Rwanda?

In which ways has Rwanda’s innovation culture influenced the development of social innovation ecosystem in the country?

Initiatives & Programs to Promote Social Innovation

How does the government promote social innovation to the public?

Could you provide examples for initiatives and programs that promote social innovation in Rwanda?

Can you think of any initiatives to raise public awareness on or to mobilize people to engage in social innovation?

What kind of opportunities for capacity-building, talent development and training in social innovation are available in Rwanda?

Rwanda’s Regional Role in Social Innovation

Rwanda’s official strategies demonstrate that Rwanda aspires to become a regional ICT and Innovation hub. Do you think that Rwanda's plan to become an ICT & Innovation Hub brings opportunities for social innovation?

Challenges for Social Innovators

We talked about the enabling factors for social innovation in Rwanda. What barriers do social innovators face in establishing social innovation and scaling its impact?

Recommendations

Is there any issue that we did not discuss, and you find important to understand Rwanda's social innovation?

Appendix 2 – Information Sheet and Participation Consent

Information Sheet and Participation Consent

Are you interested in taking part in the research project

” ‘Social innovation’ through ICTs in Africa: the case of ICT-based social innovation in contemporary Rwanda”?

Aimilia Tikoudi,

Master's thesis, 30 ECTS

Master of Science in International Development Studies

Norwegian University of Life Sciences

This is an inquiry about participation in a research project where the main purpose is to **investigate ICT-based social innovation in Rwanda, with a focus on the local social innovation culture and the innovation ecosystem**. In this letter we will give you information about the purpose of the project and what your participation will involve.

Purpose of the project

ICT [Information & Communication Technologies] constitutes a major force for socio-economic development and innovation. This present study concerns ICT-driven ‘social innovation’. Social Innovation refers to technology-driven solutions whose primary goal is to tackle major social challenges in local and regional communities.

The African continent is on the front line of ICT Social Innovation, manifested through top-down and bottom-up approaches. The study will focus on Rwanda as an exceptional case of ICT Innovation for social impact.

It investigates Rwanda's social innovation culture and the innovation ecosystem, embraced at a higher level through policy and large-scale programs, and manifested through grassroots entrepreneurial activity.

This thesis will look at Rwanda's strategies to promote social innovation, embarking from a policy perspective, and then integrating top-down and bottom-up insights to understand the expectations, challenges and opportunities behind creating an enabling environment for social innovation.

Who is responsible for the research project?

The Norwegian University of Life Sciences (NMBU) is the institution responsible for the project.

Why are you being asked to participate?

The study takes a twofold design and is explorative. Preliminarily, the study conducted document analysis on Rwanda's main ICT & Innovation policies to receive background information on high-level directions that foresee promoting social innovation. The preliminary results revealed that such efforts concentrate on social tech entrepreneurship and the private sector, mainly youth-driven initiatives, and positioning Rwanda as a regional ICT Hub with a social innovation dimension.

Sequentially, the study seeks to understand those priorities through open discussions with key informants at two levels: 'Experts' and 'Innovators'. Those reflect planning and implementation.

'Experts' include policy-makers, stakeholders at national ICT & Innovation institutions, the academia, hub managers, regulators, and individuals associated with major ICT4D programs in Rwanda and the region. Those discussions may offer an insight into the strategic goals and underlying expectations behind adopting the identified approaches in Rwanda's policies. 'Innovators' include ICT entrepreneurs, project managers, and individuals involved in large-scale or small-scale social innovation initiatives in Rwanda. Those discussions delve into practice to comprehend on-ground culture, innovators' local and community-wide impact, their motivation/incentives, and available support systems to scale impact.

Your overall profile matches the pre-determined criteria of respondents for this study, as described in the target groups for key informants above. Your professional background and experiences will contribute valuable knowledge and insights to this study.

What does participation involve for you?

If you choose to take part in the research project, this will involve that you will participate in an online interview. The interview includes questions about ICT-based social innovation in Rwanda. It may last between 1-2 hours, depending on the discussion's dynamics. Your answers will be voice recorded electronically (audio recording and transcripts, without video recording).

You will not be identified in any way, and all the provided information will be anonymous. You have the opportunity to ask any question. I will also ask you to confirm how would you wish to be cited in the research. For instance, if you agree to refer your work or institutional affiliation, or you prefer to refer the profile category you belong to according to your expertise.

At the end of the interview, you may be asked about other participants who could participate in the research. I may also ask your permission to contact you back at a later stage after the interview for any follow-up questions or clarifications.

Participation is voluntary

Participation in the project is voluntary. If you chose to participate, you can withdraw your consent at any time without giving a reason. All information about you will then be made anonymous. There will be no negative consequences for you if you chose not to participate or later decide to withdraw.

Your personal privacy – how we will store and use your personal data

We will only use your personal data for the purpose(s) specified in this information letter. We will process your personal data confidentially and in accordance with data protection legislation (the General Data Protection Regulation and Personal Data Act).

Data collected (audio recordings and transcripts) will be stored securely and will be accessible only to the researcher, the project leader (supervisor). If deemed absolutely necessary, it might be shared with academic staff at NMBU with strict relevance to the purposes of this study.

I will replace your name and contact details with a code. The list of names, contact details and respective codes will be stored separately from the rest of the collected data. You will not be recognizable in publications, except if you explicitly wish to.

You can receive a copy of the final draft of this study before it is published if you wish. You will receive the final copy after it is published. The published version of the study will also be available in Brage, NMBU's open digital research archive. The study may also be used for additional publications such as relevant academic journals.

What will happen to your personal data at the end of the research project?

The project is scheduled to end by 2022, up to 31.12.2022 (upon reviewing or other institutional processes). We will process your data for as long as it is necessary to complete the project. We would also like to store the data for a period of 2 years (up to 31.12.2024), after the end of the project in care or a follow-up study or relevant research, including your contact information to be able to communicate with you in this regard. The data will not be accessible to external entities or individuals. After the end of this period, project the data will be stored in an anonymized format.

If any change to accessing data occurs, you will be notified to get your permission. NSD [Sikt] has assessed the treatment of personal data in this project.

Your rights

So long as you can be identified in the collected data, you have the right to:

- access the personal data that is being processed about you
- request that your personal data is deleted

- request that incorrect personal data about you is corrected/rectified
- receive a copy of your personal data (data portability), and
- send a complaint to the Data Protection Officer or The Norwegian Data Protection Authority regarding the processing of your personal data

What gives us the right to process your personal data?

We will process your personal data based on your consent.

Based on an agreement with the Norwegian University of Life Sciences, Data Protection Services [NSD - Norsk senter for forskningsdata] has assessed that the processing of personal data in this project is in accordance with data protection legislation.

Where can I find out more?

If you have questions about the project, or want to exercise your rights, contact:

- Master's Student of the Thesis: Aimilia Tikoudi, aimiliatikoudi@gmail.com
- Project Leader / Academic Supervisor of the Thesis: Morten Jerven, morten.jerven@nmbu.no
- Contact person for protection of personal data (NSD) at NMBU, Jan Olav Aarflot Jan.olav.aarflot@nmbu.no
- Data Protection Officer for NMBU – Hanne Pernille Gulbrandsen | Tax & Legal at Deloitte Advokatfirma, by email: (personvernombud@nmbu.no) or by telephone: +47 40 28 15 58.
- Data Protection Services, by email: (personverntjenester@sikt.no) or by telephone: +47 53 21 15 00.

Appendix 3 – Rwanda’s ICT Policies & Strategies

SMART RWANDA MASTER PLAN (MYICT, 2015)

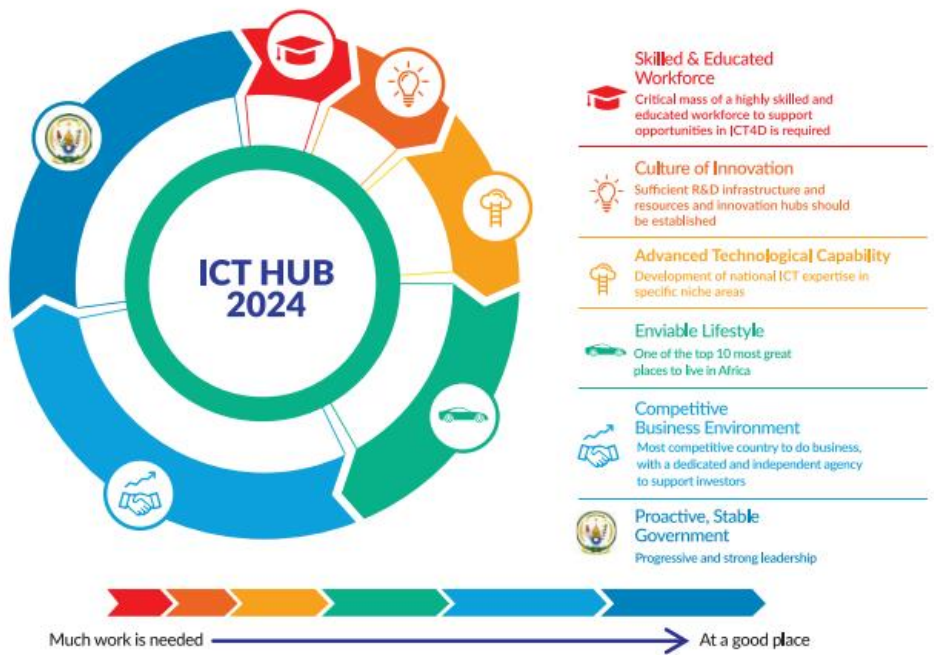
Vision	"Towards a knowledge based society"						
Theme (7 - Pillars, 3 - Enablers)	SMART Education	SMART Government	SMART Health	SMART Trade & Industry	SMART Agriculture	SMART Finance	WOY-Tech
	SMART ICT Capability		SMART ICT Governance		SMART ICT Shared infrastructure		
Goal (3)	Economic Transformation		Job creation and increased productivity		Accountable Governance		
Core objectives (10)	<ol style="list-style-type: none"> 1 Expand medical and health services to enhance citizens quality of time 2 Utilize ICT for education as a tool to enhance teaching and learning 3 Boost Agricultural productivity, industrialisation and commercialisation 4 Improve financial infrastructure to expand access to financial services 5 Promote trade and industry development by enhancing value of products and services 6 Improve and expand access to ICT skills and innovation capacity 7 Advance women and youths social economic empowerment through ICT 8 Build a shared, robust & resilient infrastructure to underpin service delivery & support national ICT initiatives 9 Enhance the national ICT Governance and Regulatory structure 10 Transform digital Government through E-Gov and effective service delivery 						

ICT SECTOR STRATEGIC PLAN (MITEC, 2017)

Strengths	Weaknesses
<ul style="list-style-type: none"> ❖ Strong political will to utilize ICT as pillar of development ❖ Strong and consistent National ICT Policies, ❖ ICT sector budget is on par with OECD countries at 1.6 percent, far above the African average ❖ Premier national ICT Network infrastructure ❖ Strong ICT related institutions RISA, MITEC, RURA, etc. ❖ Strong commitment from ICT Sector/community ❖ Focus on E-Government and E-Governance, ❖ Harmonizing ICT legislations across the region 	<ul style="list-style-type: none"> ❖ Limited skilled human resources ❖ Insufficient electricity (a prerequisite to the ICT accessibility) ❖ Inadequate financial resources/mechanisms ❖ High cost of access/usage in comparison with neighboring countries (both communication cost and availability of affordable devices) ❖ Lack of awareness about ICT and the benefits of e-government in both urban and rural areas ❖ Weak private sector ❖ High rate of illiteracy (traditional and digital) ❖ Limited innovations
Opportunities	Threats
<ul style="list-style-type: none"> ❖ Broadband networks ❖ Vibrant ICT entrepreneurship and innovation emerging ❖ Political will to develop ICT sector ❖ The country's infrastructure in place 	<ul style="list-style-type: none"> ❖ Competition among African countries for ICT Hub ❖ Global economic slow down ❖ Slow growth of skilled ICT professionals ❖ Slow growth of innovations ❖ Change of donors' and investors' priorities, ❖ Potential ICT Cyber Crime and attach against critical national infrastructures ❖ Potential loss of job due to ICT replacement

NST-1 Pillar	NST-1 Priority Area ¹	ICT SSP Outcome
Economic Transformation	Create 1.5m (over 214,000 annually) decent and productive jobs for economic development	Vibrant, competitive, and innovative ICT private sector established
	Establish Rwanda as a Globally Competitive Knowledge-based Economy	Kigali innovation city and national ecosystem operationalized
	Promote Industrialization and attain a Structural Shift in the export base to High-value goods and services with the aim of growing exports by 17% annually	Enabling ICT platforms developed for productivity
	Increase Domestic Savings and position Rwanda as a hub for financial services to promote investments	Long-term savings and innovative financing mechanisms created and operationalized
	Accelerate Sustainable Urbanization from 17.3% (2013/14) to 35% by 2024	Vibrant Smart Cities created and sustained
Social Transformation	Moving towards a Modern Rwandan Household	Empowered and transformative digital communities fostered through improved access to information and services using ICT
Transformational Governance	Strengthen Capacity, Service delivery and Accountability of public institutions	Government operational efficiency and citizens satisfaction improved
		High quality ICT skills leveraging Knowledge based Economy Developed
		Rwanda's cyber space, critical national infrastructure, and information assets made secure

RWANDA ICT-HUB STRATEGY (MITEC, 2019)



Strategic Programs and Projects in the ICT Hub Strategy and Leading Organizations (Source: MITEC, 2019, adapted)	
Flagship Projects (2019-2024)	
FS1 Data-driven farming systems and applications MINAGRI FS2 Digital finance integration MINECOFIN FS3 eGovernment services MITEC FS4 eHealth systems integration MOH	
Quick Win Projects (2019-2021)	
QW1 Review of policies, laws & regulations related to ICT Sector MITEC QW2 Creation of a baseline security standard framework RISA QW3 Development of Critical Information Infrastructure (CII) Protection RISA QW4 Adoption of national Information Security Standards RURA QW5 Consultative process towards building a National Cryptography Policy RISA QW6 Regulatory review on use and application of AI, IoT, Robotics and Blockchain Technology RURA QW7. Review National Broadband Policy (2013) MITEC QW8. Creation of a Centre for Advancement in Computer Software Engineering (CACSE) MITEC QW9 Creation of a National ICT Quality of Service framework MITEC QW10 Creation of a National Centre for Software Testing and Quality Assurance (NCSTQA) MITEC QW11. Creation of a National Technology Testbed MITEC QW12. Pan-African eNetwork (PAeN) program MOH QW13 Implementation of eGovernment Enterprise Architecture RISA	
Priority 1 Projects (2021-2022)	
P1-1 Definitions for “ICT sector” and “ICT services” Indicators for development of State of the ICT Report RURA P1-2 Increasing and Operationalizing a network of Public Internet Access Points (PIAPs) RISA P1-3 National Digital Literacy Project MINEDUC P1-4 Research projects to be sponsored by industry and government MITEC P1-5 Partnership with ICT Multinationals for commercializing R&D NCST P1-6. National ICT Career Counselling MINEDUC	
Priority 2 Projects (2022-2024)	
P2-1. Build Expertise in ICT Business Incubation RDB P2-2 Setup Rwanda ICT Export Development Fund RDB P2-3 Constituting the ICT Hub Marketing Intelligence Unit RDB	

NATIONAL SCIENCE, TECHNOLOGY & INNOVATION POLICY (NCST, 2020)

Strategies	Policy Actions
Effective STI Governance	
Strengthen STI coordination and cross – pollination	<ul style="list-style-type: none"> • Establish a Sound STI Governance framework • Establish and operationalize a National Science, Technology and Innovation (STI) Committee and Thematic Groups • Foster industry – academia collaboration. • Establish operationalize research departments/units in in public and private institutions.
Define the focus and topic of actions (STI agenda setting) in line with national development goals	<ul style="list-style-type: none"> • Establish annual STI implementation plans across sectors • Put in place a comprehensive STI M&E framework linking program outcomes to long term impact

	<ul style="list-style-type: none"> • Develop an STI data tools to inform policy decision making on trends and performance within the National System of Innovation • Conduct R&D and Innovation surveys • Conduct STI foresight studies to ensure research and innovation are in line with Rwanda's growth ambitions and global trends
Develop STI legal and regulatory framework	<ul style="list-style-type: none"> • Strengthen research regulations and accreditation. • Develop STI Standards • Establish flagship programs to promote investment
Strengthen the National intellectual property (IP) system	<ul style="list-style-type: none"> • Establish an IP Office • Provide services including protecting IP rights, promoting IP awareness, administer IPR, and promoting Innovation
Strengthen advisory on strategic and cost-effective STI Investment	<ul style="list-style-type: none"> • Conduct Science and Technology foresight studies • Establish and operationalize STI advisory committees and STI clusters • Provide advises on STI investments and targets.
Increased Scientific and Technology Output	
Strengthen Technology Innovation Support Mechanism	<ul style="list-style-type: none"> • Establish knowledge nodes, R&D and Innovation Centers including technology parks, centers of excellence, research institutes to boost the performance of the national STI ecosystem. • Establish & strengthen innovation support systems (incubation & tech transfer centers)
Foster Technology Import, Adaptation and Export.	<ul style="list-style-type: none"> • Develop capabilities to identify, import, domesticate, adapt & utilize appropriate foreign technology • Foster environmentally friendly technologies through advocacy and enforcing standards both in development and import of technologies • Establish roadmaps to promote, export and deploy local knowledge, homegrown solutions & tech abroad • Adopt a policy on open source, evolving and non-binding technologies with less dependency on proprietary technologies.
Strengthen cooperation with the Diaspora and International scientists and Innovators	<ul style="list-style-type: none"> • Establish Association of Rwandan STI Diaspora • Establish and operationalize initiatives that tap into the pool of Rwandans living, studying and working abroad in an effort to strengthen local knowledge and improve implementation of STI activities.

Promote advancement of indigenous knowledge and local technologies	<ul style="list-style-type: none"> • Support the development, promotion, protection, application, diffusion, and commercialization of indigenous knowledge and local technology.
Promote research and innovation in new and emerging technologies	<ul style="list-style-type: none"> • Formation of research clusters in S&T fields including artificial intelligence (AI), space, cyber security, ecommerce, digital health, biotechnology, nanotechnology, quantum sciences, neurosciences, genetic engineering, internet of things (IoT), big data, quantum technologies, photonics, nuclear sciences and precision agriculture
Increased R&D and Innovation Financing	
Increase investments in R&D and Innovation from public and private sector sources	<ul style="list-style-type: none"> • Advocate for annual % increase in allocation of national budget towards STI activities • Develop fundraising strategy to supplement national research and innovation funds • Develop mechanism to monitor R&D and Innovation funding. • Implement schemes to fund high impact R&D and innovation projects in key sectors.
Establish and sustain adequate research infrastructure	<ul style="list-style-type: none"> • Increase R&D infrastructure through renewal, upgrade and creation of support infrastructure and equipping R&D facilities. Monitor and Optimize utilization of R&D facilities; Monitor and Optimize utilization of R&D facilities
Incentivize Academia and Private Sector collaboration	<ul style="list-style-type: none"> • Establish strategies to foster industry and academia participation in R&D. • Establish and operationalize R&D incentives for the private sector.
Improved STI Capacity and Knowledge Networks	
Ensure dynamic STI human resources development	<ul style="list-style-type: none"> • Conduct capacity needs assessments and design forward – looking strategies to increase the quality and quantity of human capital in line with national demand patterns, growth rate and global technology changes. • Promote innovative pedagogy that strengthens critical thinking, creativity, and problem solving, leveraging STEM at all levels of education. • Develop unconventional teaching, learning, and training programs that augment formal STEM education system. • Develop programs to increase the number of competent researchers, particularly at PhD level, in order to effectively implement advanced research and innovation programs.

Diversified initiatives to promote women in STI.	<ul style="list-style-type: none"> Put in place strategies to integrate women in STI, including establishing quotas in research projects, tech companies, and across all levels of STEM.
Stimulate Research and Innovation culture and mind-set	<ul style="list-style-type: none"> Invest in initiatives aimed at nurturing a research and innovation culture, starting from the early stage of the learning process Design and implement targeted national research and innovation promotion programs.
Promote researchers' profession and learned societies	<ul style="list-style-type: none"> Put in place mechanisms to support and promote research career across the whole R&D and innovation value chain. Support R&D and scientific professional organizations.
Strengthened STI Community Outreach.	<ul style="list-style-type: none"> Develop and implement mechanisms to sensitize communities on the benefits of Science and Technology. Establish mechanisms to boost diffusion of scientific findings and integration of STI as tools to support community growth.
Enhanced International STI Collaboration	
Promote Strategic Partnerships and Collaborations.	<ul style="list-style-type: none"> Create a conducive environment that attracts foreign investments in STI. Promote and establish strategic partnerships in R&D with emphasis on capacity building, knowledge, and technology transfer. Collaborate in international networks and enable cross-disciplinary interaction between research entities and industry. Create mechanisms and incentives that facilitate cross – border collaborative, multidisciplinary research in universities, research institutions and private sector.
Attract foreign R&D and Innovation firms	<ul style="list-style-type: none"> Identify and attract world – class R&D firms focusing on areas where Rwanda has potential to lead.

ENTREPRENEURSHIP DEVELOPMENT POLICY (EDS) 2020-2024 (MINICOM, 2020)

Pillar 1: Human Capital and Management
Outcome: Improved Human Capital and Management
Output & Activities
Marketability of tertiary academic programs improved

1. Create an action plan to integrate e-learning, including MOOCs from leading global universities into the curriculum. (Strengthening linkages between local and global institutes)
2. Provide web-based training or webinars on digital marketing, service delivery and other essential courses to improve and increase online capabilities for entrepreneurs
3. Assess and adapt content of the curriculum and conduct online ToTs for teachers or physical ToTs in smaller cohorts
4. Create a plan for tertiary institutions to better integrate industry linkages in their curricula.
5. Organize trainings for teachers to be able to deliver marketable academic program in the curriculum.
6. Organize guest-lecture workshops with industry leaders and professionals to teach and provide guest lectures and seminars to tertiary students.
7. Organize competitions within and inter-tertiary institutions on specific industry problems for solution by science by business students
8. Integrate paid internship programs in curricula requirements for graduation in business and engineering courses
9. Create an action plan to introduce workplace learning, a model that includes practical training.
10. Support creation of active alumni associations among business graduates.

Applied skills into secondary school entrepreneurship curriculum strengthened

1. Create an action plan to review current entrepreneurship curriculum in secondary schools and integrate applied skills
2. Prioritize entrepreneurship by adapting digital friendly educational tools like zoom, skype, webex and facebook with the support of parents and smaller physical cohorts in schools.
3. Organize online or/and physical (smaller cohorts) training with teachers on how to deliver essential training in business plan writing, basic financial modeling, SWOT analysis, and incorporate practical “how-to” courses in the curriculum.
4. Organize business competitions that test application of applied skills such as business plan writing, basic financial modeling, SWOT analysis, and practical “how-to” courses, such as how to register a business, create a prototype, make the first sale, etc.

The reach and quality of English language instruction improved

1. Identify and work with or promote firms which deliver English language tutorials via digital platforms in developing markets.
2. Create a plan to improve the reach and quality of English teaching across the country both in-school and out-of-school

Availability of technical skills training outside of formal education improved

1. Support the development of private technical skills training initiatives
2. Support the private sector providers to deliver technical training to out-of-school populations: Identify existing private training institutions and understand their training skills specialties
3. Create a network of these institutions to share experiences and effectively coordinate activities
3. Provide advocacy, financial and non-financial support to subsidize training and facilitate digital adaptability.

<ol style="list-style-type: none"> 4. Encourage institutes to adapt to technological approaches and integrate entrepreneurship components (Take advantage of existing e-learning tools and platforms) 5. Revamp the sector-skills council (private sector needs to take the lead) 6. Promote on job learning 7. Create an action plan to provide training opportunities to disadvantaged groups, including women, youth, and persons with disabilities
<p>Business governance improved</p> <ol style="list-style-type: none"> 1. Create an entrepreneurship portal for dissemination of information 2. Design mechanisms to provide concise, relevant information to start-ups, MSMEs and large enterprises in the form of electronic or paper brochures 3. Develop short guides on basic business governance 4. Conduct short term courses and trainings on basic business governance
<p>Pillar 7: Entrepreneurial Culture</p>
<p>Outcome: Entrepreneurship culture and spirit is promoted among Rwandan entrepreneurs</p>
<p>Output & Activities</p>
<p>Entrepreneurship and Innovation key values strengthened and promoted from early age</p> <ol style="list-style-type: none"> 1. Establish a ‘detection and development’ program for innovative ideas. 2. Promote local solutions opportunities and support entrepreneurs that operate in their communities
<p>Entrepreneurial culture exchanges within Rwanda, regionally and internationally promoted</p> <ol style="list-style-type: none"> 1. Organize events with local, regional and other entrepreneurs to share their experiences with the Rwandan business community 2. Provide additional support or access to existing local and regional initiatives such as YouthConnekt Africa
<p>Equal opportunities and support enhanced for all entrepreneurs</p> <ol style="list-style-type: none"> 1. Facilitate entrepreneurship-support-organizations to design specific programs for women, youth and entrepreneurs living with disabilities 2. Conduct awareness campaigns among women, youth and living with disabilities on entrepreneurship and support programs 3. Conduct regular motivational talks from serial entrepreneurs to inspire MSMEs. 4. Conduct regular traditional and social media campaigns to destigmatize entrepreneurship failures or hurdles
<p>Source: Rwanda Entrepreneurship Development Policy (MINICOM, 2020), adapted</p>



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