Impact of National Policies on Knowledge Transfer to Small Tech Companies: The Case of Rwanda

A Dissertation

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Ph.D. in Advanced Policy Studies

by

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Abstract

In the last few decades, a number of studies have examined the contributions made by small-scale developing nation tech firms in the knowledge development and diffusion sector. Many African countries have been struggling to attract private foreign investment to support the growth of their small-scale tech firms, in support of economic development and knowledge acquisition. In the past years, a new model of international cooperation has emerged, involving new actors, typically small-scale tech enterprises from developed countries seeking low-cost IT labor, market access, locations for prototype testing, and collaboration with startups in developing African countries where national policies are flexible enough to meet investor needs. This emerging new type of relationship between small scale tech firms in developed and developing countries can be considered as a new model of international cooperation. Therefore, an incremental national policy strategy with various supporting policies aimed at creating a conducive environment with a pool of skilled human resources and business-friendly regulations flexible for emerging technologies could help address development-related challenges and promote this form of new collaboration within the national innovation system.

This dissertation examines the case of Rwanda, focusing on two key aspects: (a) how national policies are structured to promote private partnerships between small-scale foreign and domestic tech startups, and (b) how this new model of international collaboration between small-scale tech firms from developed and developing countries is formed, along with its impact on these firms. Rwanda achieved the successful transition from agriculture based economy to ICT based economy despite various disadvantages and obstacles. By addressing

the above questions, the thesis aims to unpack the factors that drove Rwanda's successful transition and attracted significant investment in the ICT sector.

The study conducted in-depth interviews with various stakeholders and analyzed secondary data from policy documents and official national, regional, and international reports and web articles focusing on startup ecosystems. The results show that national policies did impact international partnerships in Rwanda and that innovation capability enhancement was achieved by providing knowledge, training, and learning through an iterative process within collaboration between an investing Japanese small tech firm and a Rwandan partner firm. This thesis contributes to knowledge about the role of national policy in promoting knowledge transfer in small countries in sub-Saharan Africa and about the potential of African small-scale firms to contribute to global knowledge through interaction with small-scale firms from developed countries.

Keywords: Innovation system; mission-oriented policy; knowledge transfer; startups; National policy; Innovation capability; developing countries.

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Table of Contents

List of tables

List of figures

List of abbreviations

ADB	Agence de Développement du Burundi
ALU	African Leadership University
AIMS	African Institute for Mathematical Sciences
BRICS	Brazil, Russia, India, China, and South Africa
BNP	Banque nationale de Paris
CMU	Carnegie Mellon University
EDP	Entrepreneurship Development Policy
EDPRS	Economic Development and Poverty Reduction Strategy of Rwanda
EAIFR	East African Institute for Fundamental Research
FDI	Foreign Direct Investment
GIZ	German Agency for International Cooperation
GVC	Global Value Chain
GDP	Gross Domestic Product
ICT	Information Communication Technology
IMF	International Monetary Fund
ILO	International Labour Organization
IT	Information Technology
JETRO	Japan External Trade Organization
JICA	Japan International Cooperation Agency
KBV	Knowledge Based View
MINICT	Ministry of ICT and Innovation

MNC	Multination company
MNE	Multinational Enterprise
MNO	Mobile Network Operator
MOIP	Mission Oriented Innovation Policy
NCST	National Council for Science and Technology
NIS	National Innovation System
NICI	National Information Communication Infrastructure
NST1	National Strategy for Transformation
ODA	Official Development Assistance
OECD	Organization for Economic Co-operation and Development
QA	Quality assurance
SDG	Sustainable Development Goal
SME	Small and Medium Enterprise
STEM	Science Technology Engineering and Mathematic
STI	Science Technology and Information
SSA	Sub-Saharan African
RBV	Resource Based View
RISA	Rwanda Information Society Authority
RURA	Rwanda Utilities Regulatory Authority
TICAD	Tokyo International Conference on African Development
TVET	Technical and Vocational Education and Training
UN	United Nations

Chapter 1 : Introduction

1. Background of the studies

In recent decades there has been considerable debate surrounding the contribution of small-scale tech firms to the development and diffusion of knowledge and innovation. Many developing countries in Africa struggle to attract private foreign investment to support their small-scale firms because they lack national strategies for economic development and knowledge acquisition. Additionally, foreign companies from developed countries often hesitate to invest in African nations with few natural resources and a small market.

Studies suggest that governments can transform their economies by adopting some policy approaches such as (a) mission-oriented innovation policy strategies defined as a market-shaping public investment, and policy framework that concentrates on moving the direction of the innovation system strategy to shape their market environment, promote innovation and entrepreneurship, and change their industries (Kattel & Mazzucato, 2018), or (b) industrial policy to reshape the array of economic activities so as to achieve specific public goals (Juhász et al., 2023).

Previous studies on national policies have focused on government's role in adopting policy to promote knowledge flow through foreign direct investment (FDI) and multinational companies (MNCs), from developed countries into newly industrialized countries such as Brazil, India, and South Africa (Watkins et al., 2015). A limited number of studies haves

examined the role of small and medium-sized enterprises in knowledge flow (Anand et al., 2020). These studies did not address the mechanism by which national policies promote the flow of knowledge in African startups, even though those startups are driving transformation and innovation forward. Examining the case of Rwanda's national policy to determine how national policies can prompt the formation of private partnerships between foreign private firms and domestic startups in developing countries, this study captures a broad perspective on ways in which policies can transform one country by adopting a framework for mission-oriented and innovation system to understand how these policies interact. We adopt qualitative case study methodology to capture nuanced insights into Rwanda's experience of achieving rapid transition from agriculture based economy to information communication technology (ICT) based economy by means of a series of policy interventions.

Moreover, small African countries with limited natural resources, and a small market have been neglected in the literature on international learning processes and global knowledge generation. Studies on knowledge transfer in developing countries in the international context have focused primarily on the flow of knowledge from parent companies to subsidiaries (Dunning, 2001; C. S. Kogut & Mello, 2017), which suggests that firms in less developed countries learn and innovate as they participate in global value chains (GVCs) (Gereffi, 1999; Giuliani et al., 2005; Humphrey & Schmitz, 2002b; Pietrobelli & Rabellotti, 2011, 2006; Raphael Kaplinsky, 2000). As well, these studies discuss the contribution of the national innovation systems and of absorptive capacity at the firm level, to the level of learning(OECD, 1997b). To date no studies have discussed the potential of

African tech small-scale firms to contribute to global knowledge. Moreover, existing studies on knowledge transfer mostly examine manufacturing and traditional industries, with just a few examining service sectors such as offshoring of ICT services (Hough et al., 2012; Mthombeni, 2006). These studies focused mostly on large MNCs. We report here a case study of software development outsourcing to investigate international collaboration between a Japanese small-scale tech firm (Rexvirt Communication[1]) and a small-scale tech firm from Rwanda (WiredIn Ltd.).

We adopt innovation system as a framework for the work to understand how the adoption of national policy has enabled small-scale firms from developing countries to acquire knowledge, technology, know-how, and access to the market. We also explores leverage by firms from developed countries of the capabilities of small-scale tech firms from Rwanda to foster innovation. To gain rich insights into the collaboration process, we examine collaboration between Rexvirt and Wiredin Ltd in international software development.

An understanding of the factors that attract foreign knowledge to developing countries at a national level is important for, as is an understanding of how knowledge is exchanged between small-scale firms at the firm level, since in developing countries these firms play a crucial role in creating jobs and driving innovation.

[1] REXVIRT was the first Japanese company to establish an offshore software development business in collaboration with WiredIn, a Rwandan small-scale tech company specializing in offshore software development services. After entering into a software development and quality control partnership in 2014, REXVIRT & WiredIn provides top-notch software development, delivery, and maintenance services to clients in Japan, Rwanda, the USA, Germany, The Netherlands, and France.

In the following section, we outline the motivation behind the selection of the cases, the objectives and scope of the study, the methodology employed and the research questions. We then discuss the study's main contributions and provide an overview of the structure of our study.

1.2. Motivation of the studies

This section presents the motivation for the studies, consisting of the empirical context and the rationale behind the selection of the cases. Given that this thesis employs two levels of analysis—macro and micro—we begin by discussing the motivation for selecting the cases for our macro-level study. First, I describe in detail Rwanda's unique socioeconomic context, emphasizing (a) Rwanda's vision of transforming from an agriculture-based economy to an ICT-based one and (b) the current state of private investment and the sector where those investments go, all of which justifies the selection of Rwanda as a case study. I also compare the information communication and technology (ICT) policies of Rwanda and Burundi, highlighting key differences and similarities.

Next, I explain the motivation behind the selection of cases for our micro-level study, focusing particularly on our choice of Japan as a developed nation case for examination of interactions between small-scale firms.

1.2.1. Macro level

At the macro level, I selected Rwanda's policy strategy due to its remarkable success among Sub-Saharan African (SSA) countries in transitioning from an agriculture-based to a knowledge-based economy and its ranking as the second-best country in Africa for ease of doing business in 2020. Additionally, I chose Rwanda for its leading role in ICT policy adoption as a small African nation and its transformation into an emerging ICT hub.

1.2.1.1. Rwanda: socio-economic context and private investment

Rwanda is a small (26,338 km2), a landlocked and densely populated state in East Africa with a population of around 13 million (World Bank[2], 2023). The Rwandan economy is primarily focused on the service industry, tourism and agriculture. The agriculture sector provides for more than 62.2% employment for the total population (World Bank). The industrial sector, strongly linked to the processing of primary agricultural products, represents 19.3% of GDP and 8.6% of employment (*refer to Figure 1*). It is estimated that almost 70% of Rwanda's industry is located in Kigali, with little activity in the urban centers in the hinterland.

[2] https://www.worldbank.org/en/country/rwanda/overview

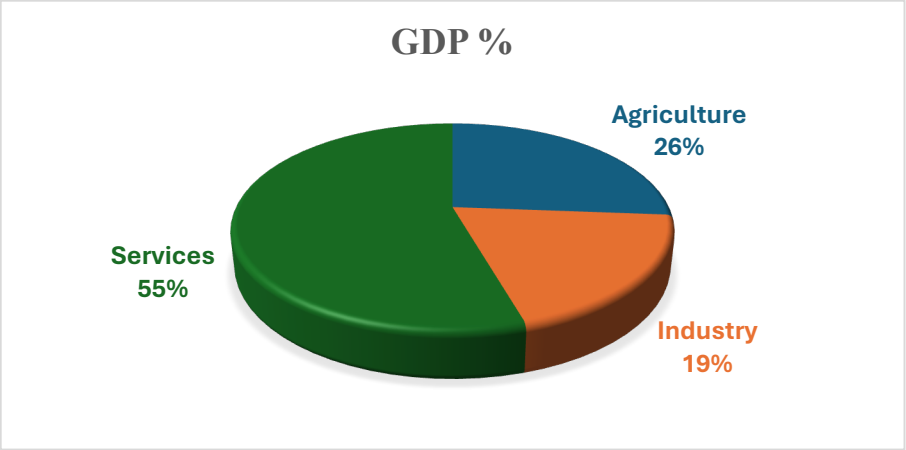

Figure 1: Contribution of agriculture, industry, and service sectors to GDP of Rwanda

Source: PNB Paribas 2020 (Author's compilation)

Over the past decade, with the assistance of the World Bank, International Monetary Fund (IMF), and other donors, Rwanda has succeeded in implementing major economic and structural reforms and achieving sustained growth. Rwanda is building its internal capacities to meet development demands by engaging local development actors and phasing out foreign direct investments (Murenzi & Hughes, 2006; UNESCO, 2015; Yongabo, 2021). According to World Bank, FDI inflow into Rwanda has shown a steady increase, from 8 million in 2000 to 366 million in 2020 (*refer to Figure 2).*

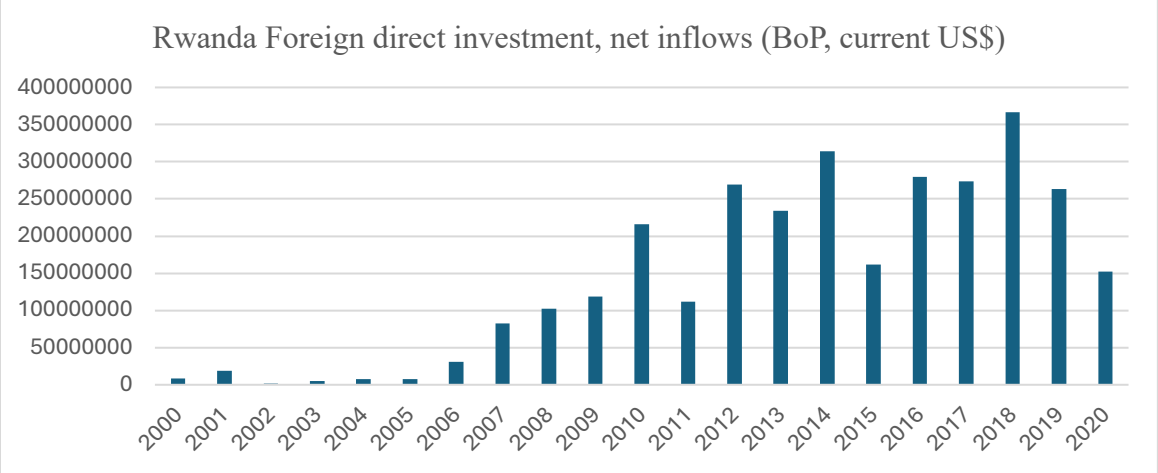

Figure 2: FDI inflow Rwanda

Source: World Bank data (Author's compilation)

This growth in FDI can be attributed to the efforts of the Rwanda Development Board to attract FDI, as well as policies such as "doing-business" reforms, which have made Rwanda a favorable destination for investment (Malunda, 2020). For instance globally, the 2019 World Bank Doing Business Index ranked Rwanda as the 29th most accessible place to do business. However, examining FDI trends across sectors between 2012 and 2016 shows a consistent pattern, with Information and Communication Technology (ICT) emerging as the primary recipient, followed by financial services, tourism, wholesale, and trade *(refer to Table 1)*. This pattern reflects Rwanda's ambition to become an ICT hub in the region (Malunda, 2020). According to ILO Report 2020, Rwanda's government has invested significantly in this goal, making the country the most connected in Africa with its high-speed broadband infrastructure coverage.

The upward trajectory of FDI inflows into Rwanda, particularly in the ICT sector, which has the highest percentage of FDI investment, underlines the need to understand governmental interventions have catalyzed private investment.

Table 1: Sectoral distribution of FDI inflows, Rwanda, 2012–2016 (%)

Sectors	2012	2013	2014	2015	2016
Administrative and support service activities	0.1	0	0.1	0	0.2
Agriculture	4.2	8	1.9	4.6	1.6
Construction	0.4	0.9	0.3	5.8	2.2
Education	0	0.5	0.6	0.7	0
Electricity, gas, steam	0.1	0.1	0	20	64
Financial and insurance activities	8.7	14.7	15	15.2	20.5
Human health and social work activities	0.2	0	0	0.2	0.4
ICT	**65.6**	**7.9**	**25.3**	**20.2**	**33.1**
Manufacturing	13.7	24.8	4.6	3.8	12
Mining	0	38.5	29.7	1.9	2
Other, service activities	0.8	0.1	0	0.1	0.2
Professional and scientific activities	0	0	0.4	0.3	0.1
Real estate activities	0	0.1	0	2	3.2
Tourism	0.7	0.8	15.6	17.6	1.3
Transportation and storage	2.3	0.4	0	0.8	0.2
Water supply	0	0	0	0	0
Wholesale and retail trade	3.2	3.1	6.4	6.9	16.8
Total	100	100	100	100	100

Source: Foreign Private Capital Census report (Author's compilation)

1.2.1.2. Comparative analysis of ICT Policies supporting ICT SME growth in Rwanda and Burundi

As an introduction to the comparison of the ICT policies of the two nations regarding ICT SME development and the resulting international partnerships in the two countries, Table 2 presents an overview of the countries ranking in terms of the ease of doing business (World

Bank, 2019) and Ibrahim Index[3] of African Governance (IIAG, 2019). It can be seen in Table 5 that compared to Burundi, Rwanda is doing rather well in terms of governance and doing business.

Second, the decision to compare the policy adopted by Rwanda and that by Burundi reflects several compelling parallels. Burundi's turbulent history, marred by military-political crises, aligns with Rwanda's past struggles. The two countries have the same ethnic composition; they are both landlocked, and they are relatively small, which poses unique challenges to economic development (World Bank, 2020). Despite those similarities, Burundi and Rwanda are diametrically opposed in term of outcome of ICT development and economic development.

Table 2: Competiveness: Rwanda vs Burundi (2019)

	Report indices	
	Governance ranking	Doing business ranking
Rwanda	12th	29 th
Burundi	43th	166 th

Source : World Bank 2019, IIAG 2019 (Author's compilation)

Between 2000 and 2020, Rwanda and Burundi independently undertook to enact a series of national policies to enhance the quality of life of their populations, and to foster investment

[3]The Ibrahim Index of African Governance, established in 2007, provides an assessment of the quality of governance in African countries. The IIAG governance framework comprises four categories: Safety and the rule of law, Participation and Human Rights, Sustainable Economic Opportunity, and Human Development
https://iiag.online/data.html?meas=GOVERNANCE-_1&loc=RW&view=overview&subview=absoluteTrends

from developed nations to facilitate economic growth. The approaches adopted by these two nations are largely similar in terms of their overarching objectives and strategic frameworks. but the outcomes of the implementation of the policies are different.

In Rwanda, the government implemented its Vision 2020 policy to transform the country from agriculture based economy into ICT based economy by 2020 (Vision 2050, 2020). This policy was built on four pillars: fostering good governance; developing a skilled human capital base; promoting a dynamic private sector; and investing in world-class physical infrastructure. The policy also emphasized the importance of research and development and innovation to attract foreign investors.

The Burundi government, on the other hand, implemented CSLP (Strategic Framework for Growth and the Fight against Poverty) I and II in 2006/2012 (Burundi Gov, 2012). These policy tools aimed at combating poverty, establishing the authority of the state of Burundi, and contributing to the economic growth of the country.

The analysis of these two countries' policy foundations revealed differences in their visions and purposes. For instance, Rwanda's Vision 2020 aims to transform its economy by creating new markets based on ICT and transforming its economy in a new one, while Burundi's policy prioritizes establishing state authority to facilitate economic growth.

In addition to the main policies that give trajectory to their economies, both countries have adopted ICT policies to set the foundation of ICT through the use of ICT infrastructure and services for economic development. Rwanda, in particular, possess an ICT-focused policy agenda to transform the country into an African ICT hub. To this end, the Rwandan government has approved key policies such as the National Information Communication

Infrastructure (I, II, III)(MITC Rwanda, 2019). These policies aim to transform Rwanda's economy from an agricultural base to an ICT-driven one, attracting private investment, creating jobs, and stimulating economic growth. In order to promote the development of innovation through ICT, the government adopted innovation policy to support SME (*refer to Table 3*).

Table 3: National policies supporting startups growth: Rwanda

Year	*Policy*	
	Rwanda	
2000/2020	Vision 2020	Enhancing the well-being of the Rwandan population by cultivating a thriving, knowledge-driven, and technology-centric economy.
	NICI I	Enabling ICT environment
2005	ICT Policy	Transforming Rwanda into an ICT hub in Africa
	NICI II	Developing ICT infrastructure
2010	NICI III	Digital development services
2011	Innovation policy [4]	Creating knowledge, fostering partnerships, supporting SMEs and startups, and advancing Science and Technology capacity in Rwanda.

Source: Author's compilation

Meanwhile, Burundi adopted a National Strategy for Information and Communication Technology in 2000, aiming to modernize and expand its telecommunications network,

[4] https://www.mineduc.gov.rw/index.php?eID=dumpFile&t=f&f=17135&token=c64ea84e90450da788598d96cc37bcd124d001e7

enhance government and public service access, and develop a skilled workforce for the knowledge economy(Gov Burundi, 2000). Burundi then implemented an ICT policy in 2007 to expand high-speed internet access, strengthen government digital services, and stimulate the digital economy(Gov Burundi, 2007). Additionally, the Burundian government adopted a national innovation policy to contribute into sustainable economic growth (Gov Burundi, 2011)(*refer to Table 4*).

Table 4: National policies supporting startups (Burundi)

Year	Policy	Policy objective
	Burundi	
2000	NICI	Developing ICT infrastructure and skilled workforce for the knowledge economy
	CSLP 1 and 2	Fighting poverty, establishment of security, creating job and promoting of good governance
2006/2012	ICT Policy	Expand access to high-speed Internet, strengthen government digital services and stimulate the digital economy
2007	Vision 2025	Providing a better quality of life for Burundians and human resource capability building to enjoy.
2010	National Science and Innovation policy	Contributing to the fair, equitable and sustainable social aeconomic development of Burundians.
2011		

Source: Author's compilation

In addition to those policies, institutions were established to promote innovation and partnership, such as (i) Rwanda Development Board (RDB), which plays a critical role in connecting foreign enterprises with local firms in Rwanda, promoting entrepreneurship, and

supporting the establishment and growth of private enterprises, both local and foreign, while fostering partnerships; (ii) Rwanda Information Society Authority (RISA) which plays a role in expanding access to and affordability of ICT, as well as preparing and coordinating programs to enhance the requisite skills in the field of ICT, all in pursuit of a knowledge-based economy; (iii) national council for science and technology (NCST) which has a mandate to identify and promote new sectors of activities requiring innovative technology and research measures essential for the nation's advancement. On the other side the Burundi Republic established Agence de Développement du Burundi, in charge to promote and facilitate local and foreign investments as well as exports (Gov of Burundi, 2021), and implemented Commission Nationale de la Science, la Techologie et l'Innovation with the mandate to contribute to the poromotion of science technology and innovation (Gov Burundi, 2014).

Comparison of the policies adopted in the two countries reveals some similarities in terms of the ICT related policies adopted and innovation policies and some institutions such as NCST (Figure 3). However, this figure show that Burundi has not adopted SME and EDP policy which are key policies in the growth of startups and small scale firm. Also, the analysis of the vision behind the adoption of the policy show that the two countries believe in the potential of ICT to drive economic growth by emphasizing human resource development. However, the outcome of policies adopted to promote the use of ICT to create value and innovation through small-scale tech firms reveals that in 2020 Rwanda was doing well in term of ICT network readiness, compared to Burundi (*refer to Table 5*). Also, the ICT

indicators for the two countries show that Rwanda had higher rates of mobile subscription and internet penetration than Burundi, which had only 3.8% of internet penetration.

Table 5: ICT development in Rwanda and Burundi (2020)

	Rwanda	Burundi
Network readiness index (Ranking/134)	96	130
Mobile subscription	80.74%	54.26%
Internet penetration	23.8%	3.8%

Source: Author's compilation

Despite their comparable institutional ICT frameworks and policies, the divergence in ICT outcomes between the two countries is significant, which points to the need for an examination of the factors behind Rwanda's superior capabilities and the capabilities of Burundi, even though the countries share some policy similarities.

Moreover, understanding the success of the policies strategies in Rwanda could serve as an example to a country like the Burundi to transform its economic landscape, attract private investment, and build a startup ecosystem because the importance of policy adoption cannot be underestimated, as it sets a framework and provides direction for a country's development (Sheriff & Muffatto, 2014a).

Comparison national policies: Rwanda vs Burundi

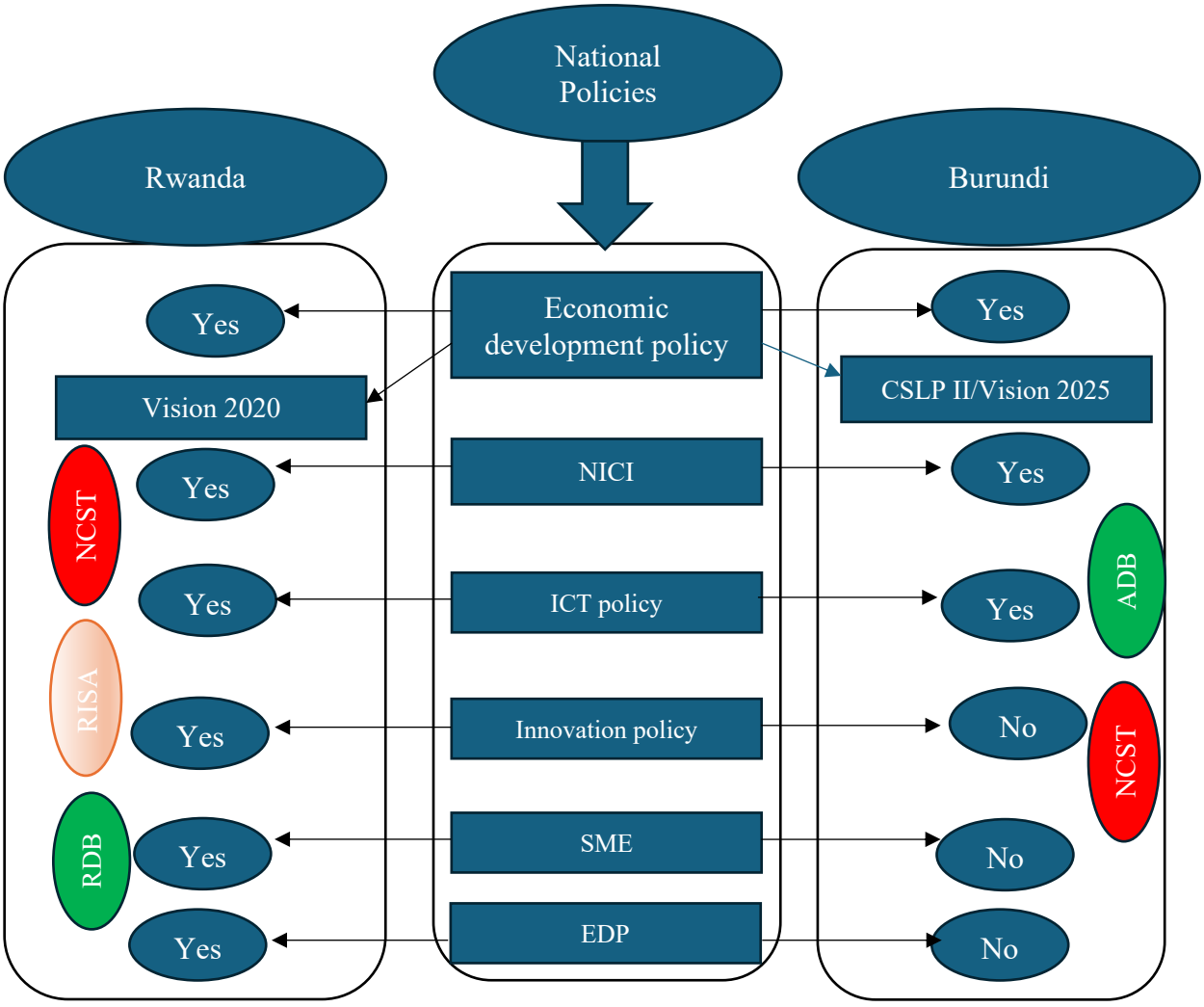

Figure 3: Comparison of national policy prompting private investment in small scale firms

Source: author's compilation

1.2.1.3. Performance of Rwanda compared to Burundi during the last two decades

GDP can be considered to be an indicator of the size of an economy or of how a country's economy is performing (Callen, n.d.; Jílková & Skaličková, 2019). World Bank data for 2000-2020 shows that Rwanda achieved higher GDP growth *(refer to figure 4)* than Burundi, with steadily, consistently increasing GDP per capita from 2000 to 2020: GDP per capita rose from $250 to $777 over two decades. In contrast, Burundi's GDP increased only slightly, from $138 to $217 during the same period *(refer to Figure 5)*. Moreover, World Bank data for 2000-2020 show that FDI investment slightly increase after 2000 to reach the highest level in 2019, while FDI investment in Burundi was highest in 2008, $117 millions but subsequently fell to less than $100 million within that period *(refer to figure 6)*.

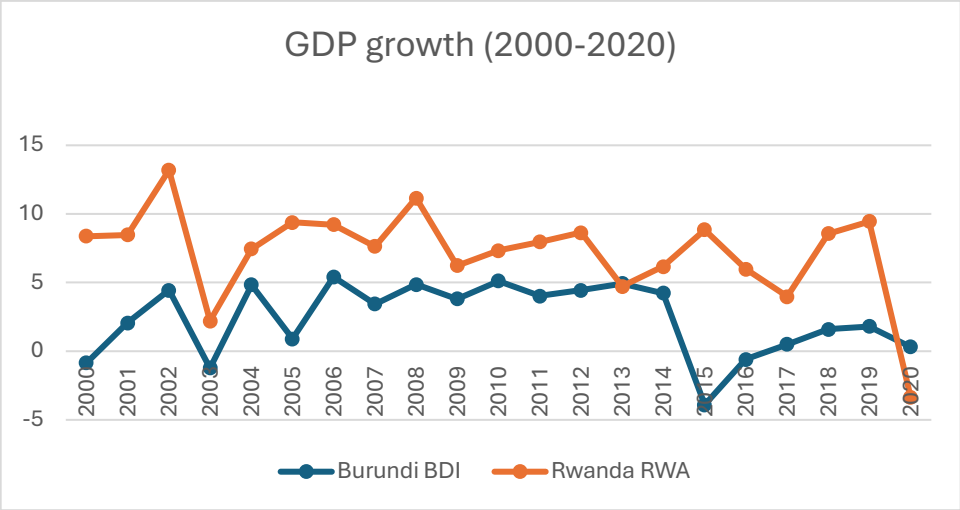

Figure 4: GDP of Rwanda and Burundi

Source: World Bank data (Author's compilation)

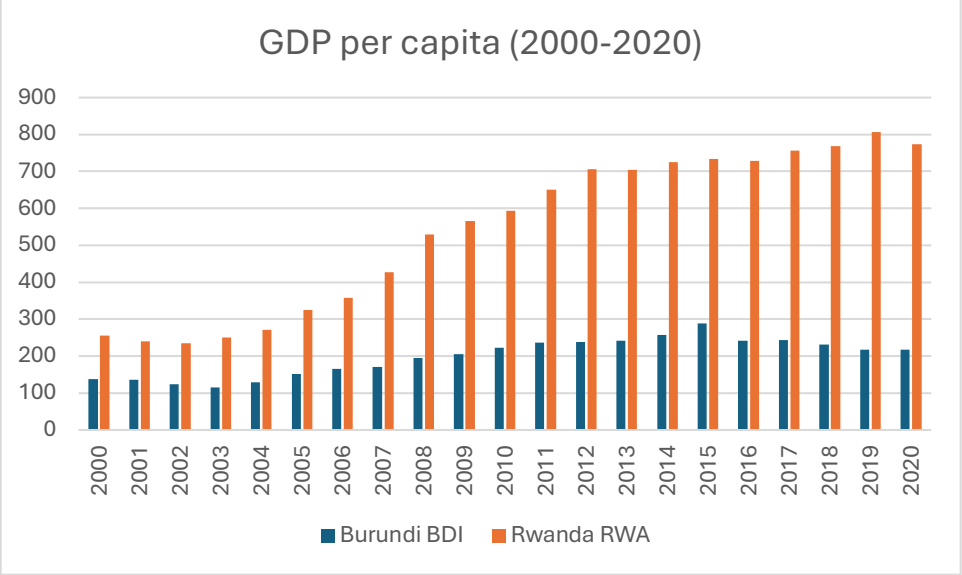

Figure 5: GDP per capita :Rwanda, Burindi and Central African Republic (2000-2020)

Source: World Bank data (Author's compilation)

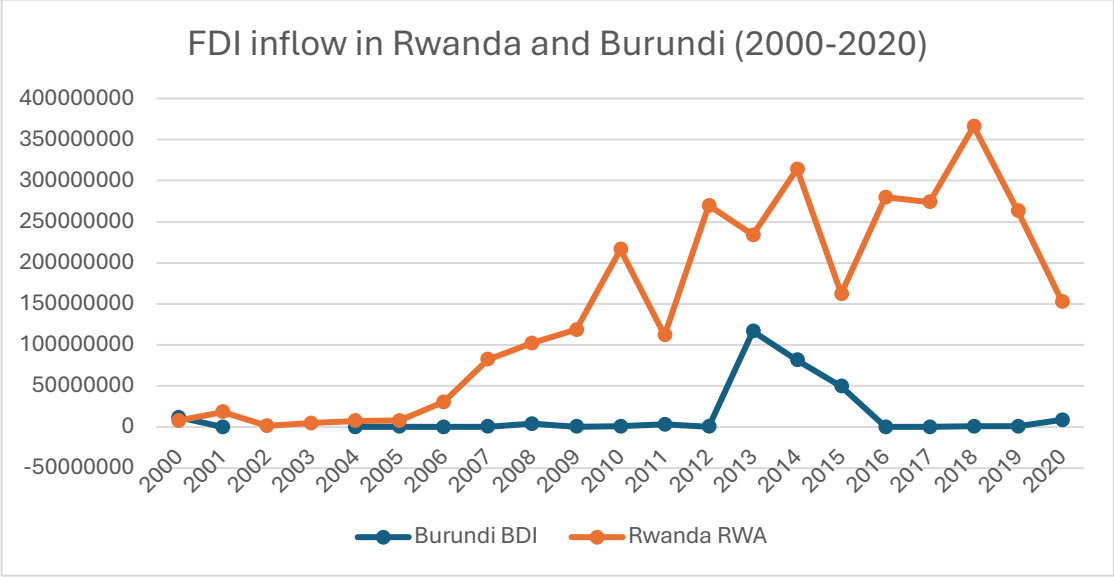

Figure 6: FDI flow - Rwanda vs Burundi (2000-2020)

Source: World Bank data (Author's compilation)

The overall data presented above show the key performance of Rwanda and Burundi. Rwanda outperformed Burundi in terms of GDP growth, FDI attraction, ICT development outcome, despite the similarities of the two countries; this highlights the need to examine the mechanism by which public policy mechanism interventions have stimulated private investment.

1.2.2. Micro level

The micro level analysis focuses on two types of collaboration: general cases involving incubators and startups in international collaborations with foreign firms, and a specific case involving collaborating between a Japanese small-scale tech firm, Rexvirt Communication and a Rwandan small-scale tech firm, WiredIn. This case of Japanese investment is chosen as the main case given its approach, which is distinct from those of other Asian countries such as China. Japanese investments in Africa primarily focus on mainstream digital initiatives across sectors such as health, education, agriculture, and postal services, in addition to development of ICT infrastructure and promoting data-driven development and digital solutions. In contrast, according to the Griffith Asia Institute, Chinese investments in Africa are mainly concentrated in manufacturing and minerals.

1.2.2.1. Japanese private investment in Africa

Existing information from Japan External Trade Organization (JETRO) indicates Japan firms have established many companies in Africa between (1980 -2020); and invested in many tech startups.

After Japan became the world's largest contributor to ODA in 1989, Japan held the Tokyo International Conference on African Development I (TICAD I) conference in 1993, aimed at assisting African countries through international contributions to promote Africa's development, peace, and security by strengthening relations through multilateral cooperation and partnerships. According to a 2022 Jetro survey, after the first TICAD, around 167 Japanese companies were established in African countries (JETRO, 2022)(*refer to Figure 7)*, demonstrating Japanese companies' interest in investing in Africa.

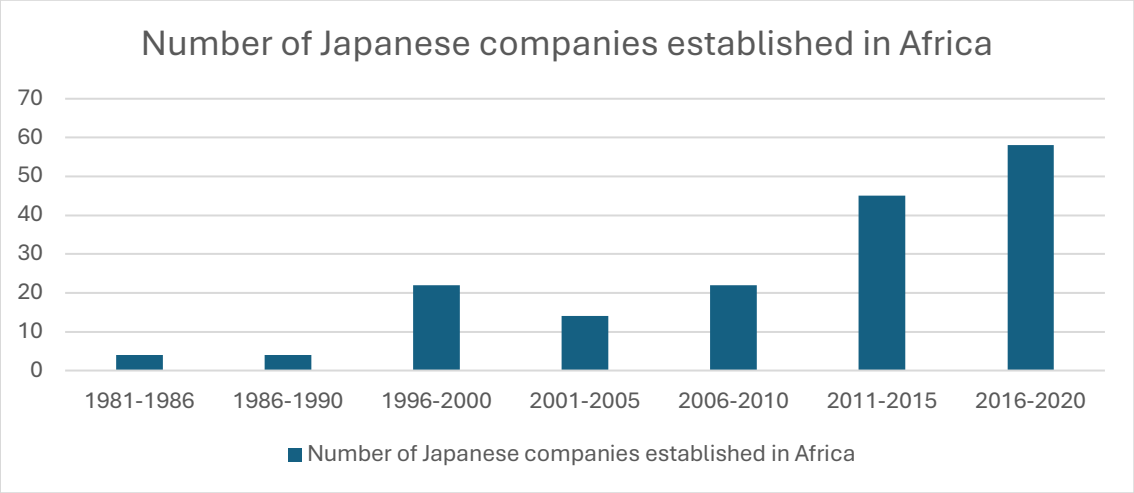

Figure 7: Number of Japanese companies established in Africa

Source: Jetro report 2022 (Author's compilation)

Moreover, Japan is considered one of the top ten countries in terms of FDI investors in greenfield projects. According to several recent studies on Japan, greenfield investment in parent companies creating subsidiaries in other countries or building new operations from the ground up totalled 9 billion between 2016 and 2020 in Africa (Morgan et al., 2022) *(see Table 1*).

Table 6: Total Greenflied FDI investment by donors in Africa

	Total FDI investment in U.S. dollars (billion)		
Country	2006-2010	2011-2015	2016-2020
China	17	19	71
Russia	5	3	33
UAE	48	20	24
United States	36	28	23
Italy	12	14	23
France	34	33	20
UK	46	25	16
Saudi Arabia	3	3	13
Germany	9	10	10
Hong Kong	1	5	9
Japan	7	5	9
Morocco	1	4	9
South Africa	14	16	8
Switzerland	11	7	7
Cyprus	0	0	6
Other	177	149	74
Total	421	341	355

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Source: usda.gov (Author's compilation)

1.2.2.2. Investing in startups and SMEs

In 2013, during TICAD 5, the Japanese government and African heads of state advocated promoting private sector-led growth as one of measures to support Africa and Japan. To strengthen other actions undertaken in previous TICAD, the Japanese government decided on one significant measure during TICAD 7 (2019): accelerating economic change and enhancing the business climate via innovation and private sector involvement. In that dynamic, the Japanese government encouraged private Japanese firms to expand their engagement in sub-Saharan Africa by moving from policy focused on official development assistance (ODA) to a private investment-based approach. Consequently, after TICAD 5, in 2013, Japanese companies, amid the global trend of digitalization, started to invest in increasing amounts in African technology-based ventures with innovative projects.

According to Nanyang Technological University a number of Japanese venture capital firms are investing in hundreds of tech startups in Africa, with investments ranging from millions to of billions of dollars *(refer to Table 7).*

Table 7: Non-exhaustive list of Japanese venture capital investments in Africa

Japanese venture capital	Investment in $ million
Kepple Africa venture	100
Uncovered Fund	15
Samurai incubates	2.5
Asia African Investment Consulting (AACI[5])	-
SBI Holdings	40
Softbank funds	3680

Source: University of Singapore (Author's compilation)

[5] https://aaicinvestment.com/about/

Moreover, the Africa Development Bank (Afdb) 2023 web report highlights the fact that Japanese mega companies and startups are showing more interest in investing in Africa. According to African Business Partners (ABP[6]), these investments are predominantly technology-based, focusing on Fintech, e-commerce, Power Tech, Agritech, and eHealth sectors. Moreover, Afridigest's 2022 report *(refer to Table 8)* revealed that two of the seven startup unicorns in Africa are owned by a Japanese VC (Opay[7] and Andera[8]).

[6] https://abp.co.jp/contents/dataroom/startup_2022/
[7] https://www.opayweb.com
[8] https://andela.com

Table 8: List of Unicorn in Africa

Company	Sector	Country	Last Public Valuation	Year First Valued at $1B+	Unicorn Round lead(s)
Interswitch	FINTECH		~$1.0B	2019	VISA
flutterwave	FINTECH		>$3.0B	2021	TIGER GLOBAL AVENIR GROWTH
OPay	FINTECH		~$1.7B	2021	SOFTBANK VISION FUND 2
wave	FINTECH		~$1.5B	2021	SEQUIDA HERITAGE FOUNDERS FUND RIBBIT CAPITAL STRIPE
andela	TALENT MARKETPLACE		~$1.5B	2021	SOFTBANK VISION FUND 2
Chipper	FINTECH		~$1.25B	2021	FTX
mnt halan	FINTECH		~$1.0B	2023	CHIMERA INVESTMENTS

Source: Author's compilation

Furthermore, Japan, like many developed countries in Europe and America, is investing in Africa because of the attractiveness of the market (Mallampally & Sauvant, 1999). However, Japan's partnership interests in startups are notable. Reports show that one Japanese company is investing in two of seven African unicorn startups and the JICA initiative to promote digital innovation in response to COVID-19 through Project NINJA[9], a unique initiative, justifying the reason for conducting a case study on Japan's partnership.

1.3. Objectives and scope of the Study

The main objectives of our study are (i) to examine the role of national policy in attracting international small-scale tech firms to collaborate with small-scale African firms in small developing countries with limited extractive resources, and (ii) to identify the mechanism of the development of the new mode of international collaboration between small-scale tech firms from developed and developing countries.

This thesis utilized a qualitative approach and case study methodology (Yin, 1994), which we considered suitable for capturing detailed insights into (a) Rwanda's national policy experience of transitioning from an agriculture-based economy to an ICT-based economy through a series of policy interventions; and (b) the fostering of development of this new

[9] PROJECT NINJA or Next INnovation with JApan (NINJA), is a startup support initiative launched by the Japan International Cooperation Agency (JICA) in January 2020. The initiative aims to promote entrepreneurship, innovation, and the creation of new businesses in order to strengthen the startup ecosystem in emerging countries (https://jica.ninja/#:~:text=PROJECT%20NINJA,startup%20ecosystem%20in%20emerging%20countries.)
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mode of cooperation between small-scale tech firms from developed and developing countries.

Two categories of in-depth semi-structured interviews (allowing open-ended responses) were conducted with different stakeholders representing distinct areas. The first category of interviews was with firm directors, the CEO of Rexvirt Communication and the CEO of WiredIn Ltd. The second interview category was interviews with executives from international firms, tech companies, and startups; and officials from government and policy institutions. In total fourteen representatives from startups, incubators, government, policy institutions, research institutions, and international agencies were interviewed for 30 to 60 minutes each between January and February 2023. To supplement the interviews, secondary data were collected from policy documents, official national, regional, and international reports, and web articles focusing on startup ecosystems and small-scale tech companies. The data were analyzed using thematic analysis, a triangulation approach, and the qualitative tool NVivo 14.

The study was driven by the following key research questions:

Research question 1: Influence of national policy on knowledge transfer

- How does national policy prompt private partnerships between private foreign firm and startups in the area of emerging technology?
- What are the factors of national policy that contribute to the attraction of private international firms in developing countries?

Research question 2: Development of the new mode of international collaboration

- How does the new model of international collaboration between small-scale tech firms from developed and developing countries develop? What are the effects of adoption of this new mode?

The questions supporting to the primary question:

- What was the impetus for initiating the collaboration?
- What supporting policy system had been designed intentionally to enable this kind of collaboration?
- What the role(s) did international organizations play in this new model of collaboration?

1.4. Main contributions

By developing responses to the above questions, this thesis provides insight into the nature of the policy mechanism developed by Rwanda to achieve a rapid transition from an agricultural-based economy to an ICT economy by attracting foreign tech companies to collaborate with startups in Rwanda. First, I present the different aspects of policies adopted and the institutional factors essential for promotion of international private startups in Rwanda. I also discuss how Rwandan national policy prompts the formation of private partnerships and investment in startups. I do so by identifying the different institutional factors that influence collaboration in Rwanda and how the policy strategy was adopted, especially through gradual, incremental implementation with good timing, sometimes combining some policies and using public institutions to ensure effectiveness.

Ultimately, the findings of this study contribute to the ongoing debate about the role of national policy in promoting knowledge transfer in small countries in sub-Saharan African by facilitating emerging technology partnerships between private foreign firms and local tech startups. I contend that developing national policy strategies with a global vision for market transformation, supported by well-defined public policies that promote ICT, human resource development, and innovation, is essential for attracting private investment in startups.

Second, by examining the case of international cooperation between small-scale firms from Rwanda and Japan, our second study diverges from previous research on African developing countries, which generally focuses on MNCs and FDI to enhance understanding of knowledge transfer. I demonstrate how this new mode of cooperation is developed, driven by two motives: accessing new markets for firms in developing countries, and obtaining skilled human resources at lower cost for firms in developed countries. I also illustrate how government-facilitated matching events were crucial in fostering this collaboration. Furthermore, I show how firms in developing countries learn and enhance their innovation capabilities through processes such as software fault correction, which enables them to catch up. The intentional creation of a conducive institutional environment has also been pivotal for the development of this new mode of collaboration.

This study contributes to the understanding of international learning promotion and provides policymakers with insights into effective fostering of international collaboration. It elucidates how African small-scale firms can contribute to global knowledge through interactions with small-scale firms from developed countries. I argue that the foundation for developing this

new type of collaboration should involve a policy strategy with five phases: (i) building ICT infrastructure; (ii) developing a pool of ICT human resources; (iii) promoting the creation of ICT SMEs; (iv) supporting the growth of SMEs and offering tax incentives to foreign firms seeking partnerships; and (v) promoting entrepreneurship and innovation through a public institution dedicated to marketing local companies and matching them with foreign firms.

1.5. Structure of the Study

The remainder of the paper is organized as follows:

Chapter 2 summarizes the literature used in the two primary studies (Chapter 3 and Chapter 4). This chapter introduces and explores all the concepts used in this thesis to inform the types of policies necessary to drive investment in startups and collaboration between small-scale firms.

Chapter 3**:** This chapter analyzes the impact of national policy on private partnerships between foreign firms and domestic tech startups in developing countries, using Rwanda as a case study. A qualitative case study methodology is employed, with data from interviews and policy documents. The chapter includes a literature review, a discussion of research questions and methodology, a description of Rwanda's startup ecosystem, and the study's findings.

Chapter 4: This chapter examines the development of a collaboration model between small-scale firms from developed and developing countries. It focuses on this collaboration's impact on African tech companies' innovation capabilities, specifically in software

development outsourcing in Rwanda. The chapter uses a qualitative approach to understand how these collaborations contribute to building innovation capabilities in local firms. It covers the theoretical background, research questions, methodology, and findings related to the ICT innovation ecosystem in Rwanda.

Chapter 5: This chapter brings together conclusions and policy implications of the findings from the previous two chapters. It identifies the study's limitations and offers recommendations for future research, which could contribute to discussions on foreign private investment, startup ecosystems, and international collaboration in developing countries.

Chapter 2 : Literature review

2. Literature review

This thesis assumes that international cooperation plays a key role in knowledge transfer for small-scale firms in developing countries. However, for developing countries to promote and engage in international cooperation that leads to learning through tech startups and SMEs, governments must use institutional tools to create a conducive environment for private international investment. This can be achieved through the adoption of specific national policies.

Understanding the types of policies needed and the frameworks for this interaction between the firms required for successful partnerships is crucial to effectively promoting private partnerships that foster knowledge transfer in small-scale firms. Therefore, establishing operational frameworks that promote international partnerships and interactions among small-scale firms is essential for such knowledge creation.

The existing literature has introduced various concepts and theories with distinct narratives to explain how knowledge transfer and interactions among firms can be effectively organized.

In this thesis, we use the following arrays of concepts:

1. **Industrial Policy, International Cooperation, and Mission-Oriented Policy**: These concepts help us understand how national policies can be utilized to drive knowledge transfer through international partnerships.

2. **National Innovation System, Innovation Capability and Knowledge Based View**: These concepts are employed to gain an understanding of how the new mode of cooperation is developed.

The following sub-sections present several key concepts that serve as references in this thesis and address our research questions. The primary concepts include industrial policy, international cooperation, mission-oriented policy, national innovation system, innovation capability and resource based view. The concepts presented here are elaborated in a comprehensive literature review of our two research papers (Chapter 3 and Chapter 4), the primary elements of this thesis.

2.1. Industrial policy

Many developing countries around the world are still trying to decide what type of policy they should adopt to promote the development of their economies. Some studies suggest the adoption of industrial policy (Hunt & Morgan, 1995). Industrial policy is defined as any government intervention or policy aimed at enhancing the business environment or reshaping economic activities toward sectors, technologies, or tasks that are anticipated to yield better prospects for economic growth or social well-being compared to what would occur without such intervention (Bulfone, 2023). However, studies argue that for structural transformation, developing countries should adopt industrial policies that create a conducive environment for Foreign Direct Investment (FDI) and multinational corporations (Joseph et al., 2019). Even though startups and SMEs represent 90% of enterprises operating in Africa (UN, 2022), only few studies that examine the impact of industrial policy on promoting knowledge transfer

into these enterprises. This gap highlights the need for further research to understand how industrial policies can be tailored to support the growth and knowledge development of startups and SMEs in developing countries.

2.2. International cooperation

With the ongoing internationalization of economics and politics, governments must become adept at engaging in international cooperation to enable access to more business opportunities and develop their economies (Yáñez et al., 2008). International cooperation is defined variously in the literature. In this study we define international cooperation as a continued multi-organizational relationship with jointly decided objectives and exchange or sharing of resources or knowledge to generate research outputs (new knowledge or technology) or foster innovation (use of new ideas or technology) for practical ends (Horton et al., 2009). Some studies note that firms enter into cooperation because of external factors that influence their capabilities (Cohen, 1990). Other studies argue that firms engage in international cooperation to access complementary resources and expertise, share costs and risks, enhance market access, and achieve economies of scale and scope.

The literature on the effects of international cooperation on firms can be categorized into three main strands: The first strand emphasizes the importance of external factors for firms' capabilities, (Cohen, 1990). The second strand of studies focused on the strategic technological alliances (Hagedoorn 1994, Archibugi and Iammarino 2002; Tether 2002). The third strand examined how international cooperation leads to innovation (Archibugi & Michie, 1995). This includes:

1) International cooperation in global value chains involving firms from more than one country, sharing know-how to develop scientific and technological knowledge, with each partner keeping its institutional identity and ownership remaining unaffected (Edwards-Schachter et al., 2011).
2) International cooperation related to the creation of knowledge and innovation by multinational corporations (MNC) (Edwards-Schachter et al., 2011).

Our thesis aligns with the third strand, focusing on the impact of international cooperation on innovation through learning and knowledge transfer among small-scale firms. However, most existing studies primarily address international FDI and MNCs in the context of knowledge transfer to firms in developing countries, often facilitated by government promotion (Awate et al., 2012; Fu & Gong, 2011).

With the emergence of a new model of international cooperation involving new actors (startups in developing countries) and international actors (private foreign firms and venture capital firms), there is a need to understand how government actions can influence this new type of knowledge transfer, from private developed nation firms to domestic startups in developing countries.

2.3. Mission Oriented Innovation Policy

Most nations around the world are eager to achieve economic progress that is both innovative and sustainable, while ensuring inclusion of all members of society (Kattel & Mazzucato, 2018). This aspiration to attain a specific type of economic development has been the

objective of many developed and developing countries. However, such aspirations require change of or reconsideration of the roles of public policies and government in the market and institutions.

Studies suggest that government and public policies should reframe their strategies to accommodate the reality and prepare their respective economies for the challenges since innovations are somehow related to incertitude (Kattel & Mazzucato, 2018). Instead, they should ask about precisely which policy mechanisms lead to the development of economic growth (Pierson, 2004). They may adopt innovation policy such as a mission-oriented innovation policy to address grand challenges such as attracting investment by both private and public actors, job creation, or addressing modern care problems.

Mission-oriented innovation policy (MOIP) is defined as a market-shaping public investment and policy framework that concentrates on moving the direction of the innovation system (Kattel & Mazzucato, 2018). Studies in this area usually couple mission-oriented innovation policies with radical technological advancements closely tied to a linear approach to science, technology, and innovation (Jensen et al., 2007).

Existing studies distinguish between two types of Mission-Oriented Innovation Policy (MOIP) in the literature: the old type MOIP and the new MOIP. The old MOIP emphasized top-down policy decisions through the establishment of government agencies and focused on large-scale scientific endeavors to tackle major issues such as nuclear energy, defense, and aerospace programs, which require substantial upfront funding for the initial development of new technologies (Mowery et al., 1996; Weinberg, 1967). In contrast, the new MOIP promotes bottom-up, stakeholder-based initiatives and addresses grand societal challenges

such as climate change (Mazuccato & Penna, 2016). Most of the literature on the implementation of Mission-Oriented Innovation Policy (MOIP) focuses on leading countries (Foray et al., 2012), with few studies addressing developing countries in Africa.

However, some developing countries have recently begun implementing policies for structural transformation based on the MOIP concept.

Despite some criticism claiming that MOIP usually takes less consideration of major demand condition within economies and can be ill-fitting and ineffective in some cases (Brown, 2021). MOIP remains an appropriate concept for gaining an understanding of how national policy prompts private cooperation between foreign firm and domestic startups. I argue that the flaws in this concept can be addressed by combining it with other complementary concepts such as national industrial policy and international cooperation.

2.4. National Innovation System

The 'Innovation Systems' (IS) concept emphasizes the complex and interactive process of innovation, positioning it at various levels (micro, meso, macro) as a key driver of economic growth. It highlights knowledge as the primary asset and learning as the fundamental process(Freeman, 1995; Muchie & Baskaran, n.d.). Innovation systems is defined as "*all important economic, social, political, organizational, institutional, and other factors that influence the development, diffusion, and use of innovations"* (Edquist, 1997).

Research on innovation systems has mainly concentrated on examining institutional settings and the interactive learning that occurs between knowledge producers and users. This concept has gained popularity and is recognized as a comprehensive framework in both academic and

policymaking communities. However, it has faced criticism for lacking specificity regarding policy matters, facilitating interactions, and for perceived deficiencies in its explanatory power (Mytelka & Smith, 2002; Niosi, 2011). In this study, we adopt the concept of the national innovation system as an approach used by developing countries like China, India, and Brazil (Prokop et al., 2021). These nations have pursued alternative national strategies tailored to their unique contexts, where they have made discernible progress.

The National Innovation Systems (NIS) approach is considered to be well suited to analyzing bounded phenomena within nations or individual firms (Etzkowitz, 2003). According to the OECD, the concept of national innovation systems is the flow of information among people, enterprises and institutions that leads to technology performance(OECD, 1997a). Some authors define it as elements and relationships (either located within or rooted inside the borders of a nation-state) interacting to produce, diffuse and use new and economically sound knowledge, (Freeman 1987; Lundvall 1992; Nelson 1993). These studies emphasize that interaction among the actors is crucial to technological progress.

Inside the NIS, government, firms, and universities play essential roles (Nelson 1993; Freeman 1995; Etzkowitz 2003; Riberio et al 2006). For example, government is responsible for formulating policy and legislation, providing fiscal incentives for entrepreneurial activity and venture creation, strengthening the infrastructure for broadband communication, learning, and innovation, preserving the environment, and protecting intellectual property and customer rights (Rustam Lalkaka, 2002). Firms play a key role in NIS; they are responsible for investing in capability building and are central to deciding where innovation will occur (OECD 1999, P 23). Meanwhile, universities and other educational institutions are tasked

with creating and developing human potential, conducting R&D, and fostering the development of innovation (Kolomytseva & Pavlovska, 2020).

The concept of National Innovation Systems (NIS) has been applied mainly to newly industrialized Asian countries and emerging economies such as Brazil, India, and South Africa, and to a limited extent to Sub-Saharan Africa. For example, Singapore's NIS model relies heavily on foreign direct investment (FDI) and multinational corporations (MNCs) for technology transfer, supported by government incentives, infrastructure development, and training programs (Edquist, 2008). This model involves significant government intervention and support for reverse engineering, patent protection, and public education to build a technical workforce (Nelson, 1993). Overall, knowledge flows from the MNCs to the NIS of these countries (Lundvall 2009).

In contrast, the African NIS model, which began in the 1980s, is driven by regional agencies like the East African Science and Technology Commission (EASTECO)[10] and the Inter-University Council for East Africa (IUCEA),[11] focusing on coordinating standards and facilitating education, research, and innovation (African Union Commission 2014; UNESCO 2015). Although there was interest in STI, many sub-Saharan African countries did not see it as a priority (Yongabo & Göransson, 2022), perhaps because their economies were more natural resources development-oriented rather than knowledge-based development-oriented (Freeman, 1995). However, in recent decades, many sub-Saharan African countries have initiated efforts to support the development of National Innovation Systems (NIS) to foster

[10] https://easteco.org
[11] https://www.iucea.org

tech small-scale firms. In some African countries the NIS framework provides opportunities for tech small-scale firms to partner with counterparts from developed countries, accelerating economic growth. Therefore, the NIS framework is a powerful tool for gaining an understanding of how these interactions between small-scale firms from developed and developing countries.

2.5. Innovation capability of firms in developing countries

Innovation can only take place if a firm has the capability to innovate(Laforet, 2011). Innovation capability represents a company's main process and is intricately linked to other business practices (Lawson & Samson, 2001). Innovation capability is defined in various ways in the literature. In this thesis we use the definition of Lawson and Samson (2001), who refer to innovation capability as "*the ability to continuously transform knowledge and ideas into new products, processes and systems for the benefit of the firm and its stakeholders*."

Some elements of the literature on the innovation capability of firms in developing countries underscore the notion that innovation is fostered through investment in learning (Henderson and Clark 1990, Figueiredo and Brito 2011; Fagerberg 2010, Lim, Han, and Ito 2013 and Fan 2006). Other studies underline the importance of firm capability development in the global value chain (Humphrey & Schmitz, 2002a; Hirshhorn 2015; Ng 2013; Keijser and Iizuka 2018). Most studies on international learning exchange have focused mainly on MNCs, suggesting that firms in less developed countries learn, innovate and develop their capability in proportion to their participation in GVCs (Gereffi, 1999; Giuliani et al., 2005; Humphrey & Schmitz, 2002b; Pietrobelli & Rabellotti, 2011, 2006; Raphael Kaplinsky, 2000).

However, when it comes to the innovation capability of small-scale firms, studies on startups highlight its crucial role in the innovation process, emphasizing that the success of tech small-scale firms depends significantly on their innovation capability, particularly the type of research they are engage in and their absorptive capacity, which enables them to learn from external sources (Burns, 2016). The existing literature primarily considers innovation and catching up in the context of traditional firms, with firms in developing countries advancing through their participation in global value chains (GVCs). Nonetheless, the collaboration between a developed nation small-scale firm and a developing nation one differs from interactions within a GVC, in that involves small-scale firms rather than multinational corporations (MNCs). By focusing on innovation capability in terms of knowledge, we can better understand the dynamics of knowledge transfers between small-scale firms and the ways in which these interactions contribute to innovation capability development in an African country.

2.6. Knowledge based based

The knowledge-based view (KBV) has significantly influenced the development of the international business field (Stoian et al., 2024). Knowledge based view is defined as a pratical knowledge a firm possess to achieve appropriate goals via interinstitutional collaborations (Hegde & Hicks 2008; Singh 2004). Most studies on KBV have primarily focused on multinational enterprises (MNEs), emphasizing the role of KBV in understanding their international collaborations. These studies adopted KBV to understand the international collaboration of MNEs, emphasizing its role in acquiring an understanding of the international collaborations of those MNEs (Kogut & Zander, 1993). However, KBV can be

effectively applied to gain an understanding of the processes of learning and knowledge creation in international collaborations between small-scale firms from developed and developing countries. This approach has been utilized previously to interpret the existence and dynamics of MNCs (Dutta & Beamish, 2013; Pollitte et al., 2015).

2.7. Analytical framework

At the macro and micro level, the NIS model has been used as the primary analytical framework to explore and gain an understanding of the interactions between small-scale tech firms from developed countries and those in Rwanda, leading to a learning process. This framework was also utilized for institutional analysis systemic interactions among stakeholders. The NIS model has been employed to analyze various elements at the firm level.

In Chapter 3 of this thesis, I have employed a combination of industrial policy, international cooperation, and mission-oriented innovation policy (MOIP) to determine how government policies prompt private partnerships between foreign firms and local startups in Rwanda. The MOIP and industrial policy were used for macro-level analysis, with policy serving as the unit of analysis.

The macro-level analysis revealed essential patterns that I subsequently examined in Rwanda's policy strategy for transitioning from an agricultural to an ICT-based economy. This approach laid the foundation for my exploration of significant policy and institutional issues.

Industrial policy and international cooperation were also used as secondary tools to complement the MOIP. This was necessary for bridging gaps in the MOIP, which, as a second generic analytical framework, did not fully address the specific issues of relationship building, policymaking, and policy implementation. The complementary industrial policy and international cooperation provided insights into these areas.

These tools were employed to examine the policies implemented and the mechanisms connecting these policies to key institutions. This helped trace the trajectories of the national policies and the institutional factors that helped attract private investment to startups.

In Chapter 4 of this thesis, I have employed a combination of national innovation systems (NIS), innovation capability, and the resource-based view to determine how new modes of collaboration between small-scale tech firms from developed and developing countries are formed, and their effects on the firms involved.

At the micro level, the NIS model was used as the primary analytical framework to explore and understand the interactions between small-scale tech firms from developed countries and those in Rwanda, interactions which led to a learning process. This framework was also utilized for institutional analysis and examination of systemic interactions among stakeholders. The NIS model was employed to analyze various elements at the firm level.

Innovation capability was used to complement the NIS model to understand the factors influencing small-scale firms in this new mode of collaboration. Additionally, the knowledge-based view was applied to gain precise insights into the types of knowledge these international collaborations bring to interactions.

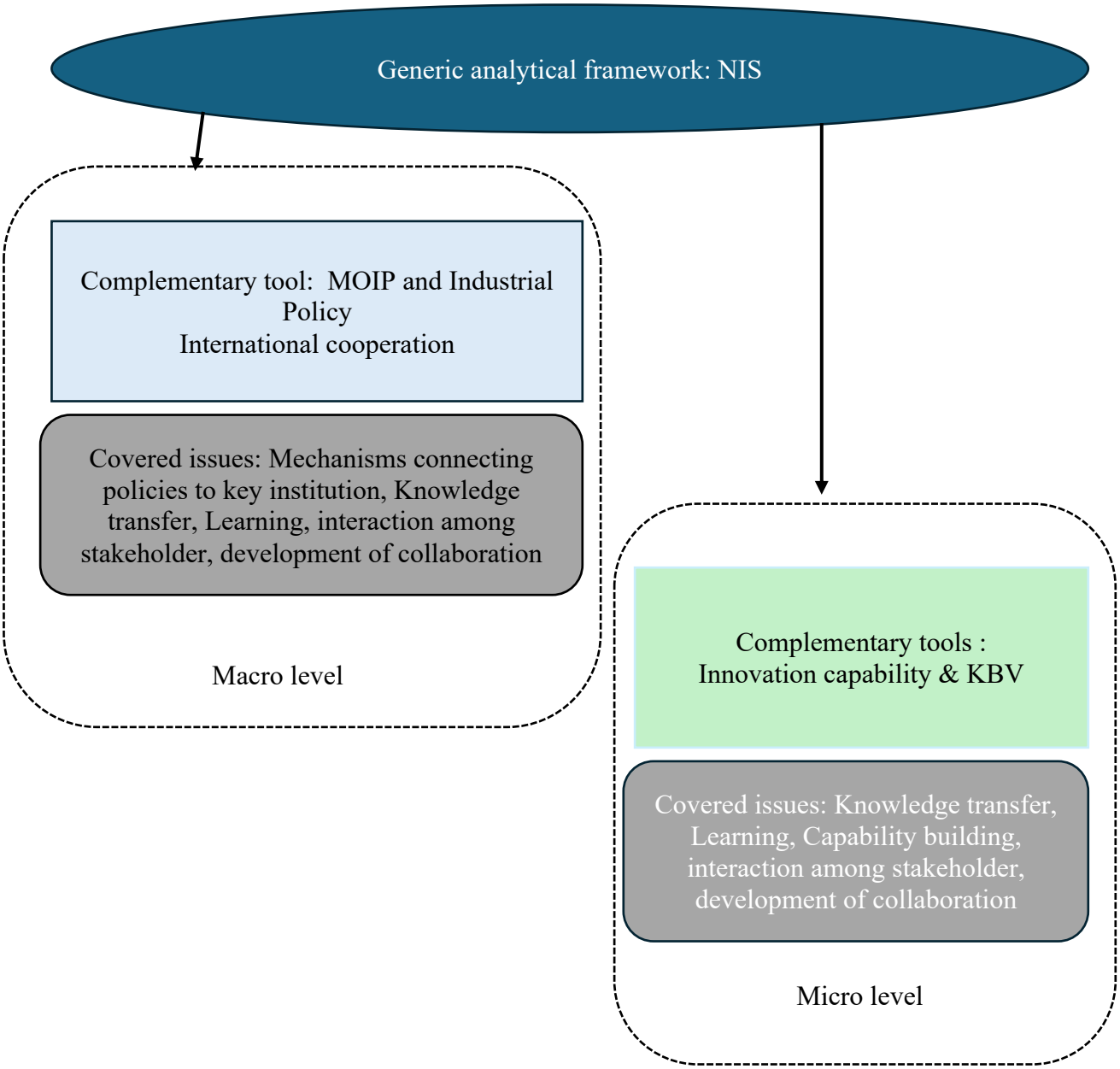


Figure 8: Analytical framework

Source: Author's compilation

The previous chapter discussed concepts that are applied in Chapter 3 to understand how national policies encourage private partnerships and in Chapter 4 to examine the formation of new collaboration models between small-scale firms from developed and developing countries. The following chapter will explore Rwanda's distinctive policy interventions aimed at transforming the country from an agrarian-based economy to a knowledge-based economy.

Chapter 3: Analysis of the impact of the national policy on innovation between foreign firms and domestic tech startups in developing - Evidence of startups in Rwanda-

3.1. Introduction

In the last decade, a new model of international cooperation has emerged involving new actors in Africa (startups) and international actors (private foreign firms and venture capital firms). For instance, small medium tech enterprises from developed countries in search of locations for prototype testing (Iizuka & Ikeda, 2019) come to have partnership with startups in developing countries in Africa where national policies are favorable for the development of emerging technologies. An understanding of the relationship between this new model of international cooperation and national policy in developing countries is distinct from conventional model of international cooperation that focus on the role of foreign direct investment (FDI) and multinational companies (MNCs) and public policies addressing the market failure, on providing conducive environment for FDI and MNCs to improve domestic productivity (Bisztray & Poitiers, 2022) . These studies, moreover, took place mostly in newly industrialized countries in Asia and emerging economies such as Brazil, India, and South Africa., and only limited studies are found on sub-Saharan Africa (Watkins et al., 2015).

Hence, a clear understanding of how the relationship between foreign firms and tech startup might be applied to the African context, where it is essential to create markets for the emerging digital services by startups. policies also must focus on a conducive ecosystem for the new actors. This calls for different incentive mechanism though policy goals stay the same; addressing big challenges such as attracting investment from private and public actors; creating jobs (Kattel & Mazzucato, 2018). Another important point that needs to be mentioned is policies being the enablers for African countries to drive their digital agenda, attract foreign investment and develop a startup ecosystem in the direction that they wish to develop while creating jobs and resolve social issues, and enabling to grow. This requires public capability to structure and implement policies to manage bilateral partners and private foreign firms from developed countries (OECD, 2019).

In other words, public policies can play a vital role in attracting the investment necessary for the promotion of the growth of startups critical for addressing local agenda through training, or job creation. In fact, tech startups are becoming an object of private and public impetus policies in middle-income developing mixed countries (e.g., Brazil) because of their capacity to attract foreign investment and technologies (Audy & Piqué, 2016; Wolff, 2022).

Without startups or small and medium enterprises (SME), some developing nations would be less able to exploit opportunities and attract investors. In recent times, governments of certain developing countries have made a significant shift in their approach towards national policies. They are now looking beyond the conventional role of correcting market and institutional failures by reframing their strategies to accommodate the reality of the market and prepare their respective economies for challenges since innovations involve a degree of

uncertainty (Kattel & Mazzucato, 2018). Basically, governments are creating and shaping markets that could increase business expectations around future growth opportunities, and in turn drive private investment (Kattel & Mazzucato, 2018).

According to a recent investment report on climate reform facilities (ICR report, 2021), Click or tap here to enter text.in 2021, at least 16 African countries had feed-in small business acts (SBAs) that promote the establishment and development of startups and SMEs. These SBAs foster the development of a suitable environment for the development of startups and the attraction of external knowledge.

Further, in the era of emerging technology, private foreign firms, that exploit the emerging technology facing legal barriers in their home countries or confronted with rigidity of regulation in the process of getting market access scaling up (Iizuka & Ikeda, 2019). Hence these firms often look for locations where they can test their technology. In that light, developing countries, with right conducive environment, can offer the place for these firms to experiment through promotion of agile and flexible policies and regulatory institutions. These policies, with right design, may enable to attract new knowledge and emerging technology that can serve to overcome local challenges (Featherston et al., 2016).

Despite the potential opportunities presented to developing countries, especially in Sub-Saharan African countries, existing literature on FDI and MNCs does not offer a framework to understand the current situation in which these countries are under. There is a need for a deeper understanding of how national policies can prompt private partnerships between

foreign firms and domestic startups, and of establishment of national policy instruments that help to trigger partnerships development between the two parties. This paper explores the above through the illustrative case of Rwanda, which managed to transform into ICT specialized country over the 25 years.

This paper is structured as follows: a review of the literature on national policies, focusing on transforming national developmental directionality; a section that outlines the research questions, conceptual framework, and operationalization; the methodology; a case study of Rwanda; and finally, the findings.

3.2. Literature review

Academic debate centered around the critical role of national policies in developing country growth and facilitating knowledge. These debates can be grouped into the following: (a) policy that concern knowledge flow via FDI and MNC from developed foreign countries in newly industrialized countries such as Brazil, India, and South Africa, and to a limited extent in less developed economies in sub-Saharan Africa (Watkins et al., 2015); and more recently on (b) policy that focus on the role of SME in knowledge flow (Anand et al., 2020). This knowledge flow is promoted by national policy. It is worth noting that most studies are concentrated in Asia and BRICS (Tome, 2013) .

However, in the last decade, a new model of international cooperation has emerged, involving new actors in Africa (startups) and international actors (private foreign firms and

venture capital firms). Studies on startups have observed that startups are becoming an object of private and public incentive policies in middle-income developing mixed countries (e.g., Brazil) because of their capacity to attract foreign investment and technologies (Audy & Piqué, 2016; Wolff, 2022).

The studies mentioned above did not address how national policies promote the flow of knowledge in African startups. Furthermore, supporting startups' knowledge flow and innovation requires assessing whether policy intervention is needed to build their capability and, if so, determining how it should be implemented to nurture them effectively. This study focuses on startups because they are the ones driving transformation and innovation forward.

Moreover, research on national innovation systems places innovation at different levels (micro, meso, macro) and acknowledges that innovation serves as a driver for economic growth with knowledge as the key asset and learning as the fundamental process (Freeman, 1991; Metcalfe and Ramlogan, 2008; and Baskaran and Muchie, 2017). The existing literature has identified four main approaches underlining international private partnership where national policy plays a role: (1) industrial policy; (2) international cooperation; (3) innovation ecosystem and (2) mission-oriented innovation policy.

3.2.1. Effect of industrial policy on the promotion of catching up and learning in developing countries

Studies define industrial policy it as government strategies intentionally designed to reshape the composition of economic activities to accomplish particular public goals(Juhász et al.,

2023). For instance, in industrial policy, the government targets structural change through the exercise of discretional choice on deciding to promote the X sector but not the Y sector. Some studies argue that governments have been using industrial policies to attract foreign direct investment from multinational companies because companies would generate employment (Joseph et al., 2019). Others have observed that a lack of policy dedication could make a country more inclined to step into international agreements because a nation facing a domestic commitment issue has comparatively more to gain from securing well-organized policies (Conconi & Perroni, 2009). Industrial policy in the current literature has been the subject of debate centered around three points.

First, industrial policies leveraging low wages to attain competitiveness help lower-income countries (Hunt & Morgan, 1995; Foster & Azmeh, 2019). However, some authors, e.g., Stiglitz (2003), hold that this approach basing on wage differential is not suitable for developing countries, as it has not always led to economic and structural transformation that ensures sustained economic development. As a solution to the criticism of Stiglitz, Lall (1992) and Mathews & Cho, (2000), propose that government policies in developing countries should focus more on technology transfer and technological capability building to attain structural transformation. Similarly, Featherston et al. (2016) suggests that developing countries eager to achieve economic growth may consider promoting agile and flexible policies and regulatory institutions to attract new knowledge and emerging technology to help them overcome local obstacles.

Second, should governments orientate inward [12] or outward [13] policies toward industrial policies ?(Foster & Azmeh, 2020). The world system and dependency[14] theory argues that it is essential for developing countries to break away from their adverse position in the international division of labor to achieve industrialization (Wallerstein, 1974). For example, the economic development of East Asian nations was accomplished through outward policy that promoted export, selective import barriers, and industrial policies initiated by the government (World Bank, 1993). The government used foreign direct investment attraction industrial policy as a tool by providing tax incentive policy, duty exemptions and deregulated policy to attract multinational companies because they will generate employment (Joseph et al., 2019). Furthermore, some studies argue that the government's provision of conducive environment for FDI (eg.. Roads, electricity, telecommunications, and school facilities) is crucial for fostering industrialization and economic development. (Murphy et al., 1989).

Third, to what extent should government intervention be to aimed at shaping and putting a country in the global economy? (Foster & Azmeh, 2020). Studies have found evidence that initiating good institutions could strengthen firms in exports and internal and external policies, leading in turn to economic development. Acemoglu et al., (2004), argue that economic institutions play a crucial role in driving economic growth. According to (Constantine, 2017), economic growth is influenced by both economic and political institutions, as well as

[12] Inward-oriented policies refers to the pursuit of economic independence or self-reliance by developing countries.
[13] An outward-oriented strategy is one in which trade and industrial policies do not favor the domestic market, exports, domestic goods, or foreign goods (World Bank, 1987)
[14] Dependency theory suggests that resources flow from underdeveloped states to wealthier ones, benefiting the latter at the expense of the former.

state intervention. Moreover, some studies have underlined that innovation systems observed that promoting catching up through learning may be achieved through the development of an institutional environment fostering the global value chain (GVC), as GVC membership is essential for accessing knowledge and enhancing learning and innovation (Pietrobelli & Rabellotti, 2011).

Moreover, government support for the organization of the business environment is common (Coad, 2014; Davidsson & Henrekson, 2002). For example, Institutional factors such as intellectual property rights, taxation, labor market legislation, or financial and legal obstacles to business creation can impact economic activity across sectors (Coad, 2014; Davidsson & Henrekson, 2002).

In the African context, the debate on national industrial policy turned around how African nations could enhance industrial performance at the sub-regional level. These debates took place at the continental level through the Conference of African Ministers of Industry (CAMI) under the auspices of international organizations such as the United Nations Industrial Development Organization (UNIDO) and New Partnership for Africa's Development (NEPAD). The debate centered around the diversification of productive capacities using Africa's natural resources and promotion initiatives that upgrade and transform industries(Marti & Ssenkubuge, 2009). Also, implementing specific measures to promote industrial development at the country level (promoting export and attracting FDI). To do that, what sort of policy interventions are necessary?

Nonetheless, recently in their efforts to attract foreign private investment and promote innovation in developing countries in Sub-Saharan Africa, governments have started to focus on startup and innovation policies. According to a recent investment report on Investment Climate Reform (ICR report, 2021), aside from Tunisia and Senegal, which have startup acts in place, at least 16 African countries had feed-in-small business acts (SBAs) which promote the development and the establishment of startups by taking into account their particular needs (Fund, training, tax incentive subsidies). Such small business policies have successfully promoted inter-firm cooperation between private foreign firms and African startups and induced technological innovation.

3.2.2. International cooperation and knowledge transfer

Given the need for economic development, national governments worldwide are formulating and implementing policies aimed at promoting private cooperation (partnerships) between foreign tech small-scale firms and local tech small-scale companies. Indeed, such partnership or cooperation is defined as an ongoing multi-organizational relationship with jointly decided objectives aimed at exchanging or sharing resources or knowledge to generate research outputs (new knowledge or technology) or foster innovation (use of new ideas or technology) for practical ends (Horton et al., 2009). While international cooperation is essential for international knowledge transfer, some studies suggest that global value chains are crucial in facilitating knowledge flow across countries, thereby increasing productivity over time(Bisztray & Poitiers, 2022). Other studies observe that GVC helps firms in developing countries access markets and knowledge and enhances learning and innovation(Pietrobelli & Rabellotti, 2011).

The above literature mostly discusses the knowledge flow facilitated by MNCs and GVC but does not examine the flow of knowledge in startups. Therefore, it is important to understand how national policies promote the flow of knowledge in African startups.

3.2.3. Mission-oriented innovation policy

Mission-oriented innovation policy (MOIP) is, by definition, a market-shaping public investment and policy framework that concentrates on moving in the direction of the innovation system (Kattel & Mazzucato, 2018). Burlamaqui (2006) argues that mission-oriented policies are instruments in the (Schumpeterian) market-shaping framework to focus policy debate on which direction public efforts should take to enhance firm-level entrepreneurship. Other studies argue that mission-oriented policies offer a framework that enables the public sector to overcome endemic policy coordination failures (Ergas, 1987, p.194; Kattel & Mazzucato, 2018) and that public investments have created a technological frontier that coincided with private sector developments, leading to multiple new search opportunities for firms (Dosi, 1981, p. 10-11).

MOIP in the 80s and 90s was mainly concerned with large-scale technology (Conesa & Dosi, 1998; ERGAS, 1987), with project defense-related and R&D in government expenditure in advanced countries. More recently, MOIP has been concerned with social challenges requiring concerted efforts and societal transformation by introducing emerging technologies (Mazzucato, 2018).

The latest application of MOIP is relevant to developing countries, by focusing on:(i) related to the UN Sustainable Development Goals (SDGs) social challenge such as fighting health

inequalities, the digital divide, and climate change, (ii) and strengthening the capabilities of the public sector to solve social issues (Mazzucato, 2023). The focus on the public sector's capability is considered a fit for economic development because of the embryonic level of the market (Alves et al., 2020). Edler and Boon (2018) claimed that MOIP, usually give less consideration to major demand condition inside economies and can be ill-fitting and ineffective in some case (Brown, 2021). For instance, Markusen (2003) argues that MOIP represents fuzzy policymaking with considerable opacity, needs more details, and fails to conform with the nature of the regional innovation and the connected entrepreneurial ecosystem.

Despite above criticisms, MOIP remains an appropriate concept that can be used to understand how national policy prompts private cooperation between foreign firm and domestic startups.

Overall, the studies above discuss how different policy interventions had been implemented in the past, starting from industrial policy-driven capacity development in many countries, such as East Asia, where external forces were used to build capabilities through interacting with the market. They discuss the learning to upgrading through interaction, via FDI and international trade. While the interaction is important in acquiring the capabilities, the knowledge and capability does not flow like a water. It requires conscious efforts made by government in research, human resources development and building institutions. The policy discussion at that time was, therefore, focused on the capability to accessing existing market elsewhere.

The recent approach to MOIP focus on creation of market while the previous approach which failed to address the issue faced by foreign firms in the quest for ground to test or develop their innovation before commercialization as they are confronted with the rigidity of institutional conditions in the home country. However, we argue that the niche market is created under the new model of international cooperation involving new actors in Africa (startups) and international actors (private foreign firms and venture capital firms). This niche market may lead to the creation of knowledge and technology that also contribute to solving the social issues and unemployment in Sub-Saharan Africa (SSA).

3.2.4. Research questions

In the previous section, the literature review revealed that studies did not address how national policies promote the flow of knowledge in African startups and some areas that require further investigation. First, it shows that there is a change in discussion on "industrial policy" or the role of the government. The existing literature focused on FDI and export, concentrating on capability of accessing external market rather than creating a new market, attracting foreign investment, and helping countries achieve economic development and catching up. Current discussions on industrial policy put the policy in the central stage and asks how the policy should be implemented.

Furthermore, current literature refers to the role of policy in prompting private partnerships between foreign MNCS private firms and domestic startups in developing countries; this explicitly addresses emerging technologies, such as digital ones. These new technologies

often do not have clear regulations, and by not having regulatory institutions, they hamper the commercialization of products using/applying these technologies (Iizuka & Ikeda, 2019). The regulatory barriers force the firms to go in the countries with more adaptative and flexible institutional conditions (Dietz et al., 2003). This presents different context for public policy.

Second, the literature showed that national policy could foster the transfer of knowledge from MNCs in developed countries to the recipients in developing countries or emerging countries (Rui et al., 2016); nonetheless, existing studies failed to document the factors of national industrial policy that contribute to attracting private foreign investment that work with startups in developing countries.

Based on the above understanding, this paper address following questions:

- How does national policy prompt private partnerships between private foreign firm and startups in the area of emerging technology?
- What are the factors of national policy that contribute to the attraction of private international firms in developing countries?

3.2.5. Conceptual framework

In this study, we explore the concepts of industrial policy, international cooperation, innovation ecosystems, and mission-oriented innovation policy within the framework of national innovation systems. This framework enables the analysis of (i) means by which governments in developing countries facilitate partnerships between foreign firms and local

startups; and (ii) the policies and mechanisms used to ensure the successful implementation of these initiatives, aiming to transform countries into knowledge-based economies.

We argue that the limitations of these concepts can be addressed by integrating them into a same research. After reviewing the literature on each concept, we identified several key factors. For instance, the literature suggests that:

1. Industrial policy provides a conducive legal framework and requires the adoption of flexible and agile policy and infrastructure for economic growth;
2. International cooperation fosters learning and capability building;
3. Innovation ecosystems create a conducive environment for the fostering of innovation; and
4. Mission-oriented innovation policies offer a conducive environment with available infrastructure for the transformation of a sector of the market by promoting flexibility and facilitating learning.

We selected factors that appeared at least twice in our conceptual framework (*refer to Figure 9)* to identify which could be used in our analysis to determine whether national policies influence the attraction of private international firms to developing countries. After our analysis, we identified the following key factors: learning and capability building, a conducive legal framework, flexibility, and policy and infrastructure agility.

To explore the impact of these factors, we chose Rwanda as a case study to understand how they influence private international firms in developing countries. In 2000, the Rwandan government launched Vision 2020 to transform its economy from agriculture-based to ICT-based. The government implemented various policies to achieve this goal. Rwanda's unique

experience provides valuable insights into how national policies can promote foreign partnerships.

Conceptual model of how national policies prompts private emerging technology partnership between foreign firms and local startups in a developing country.

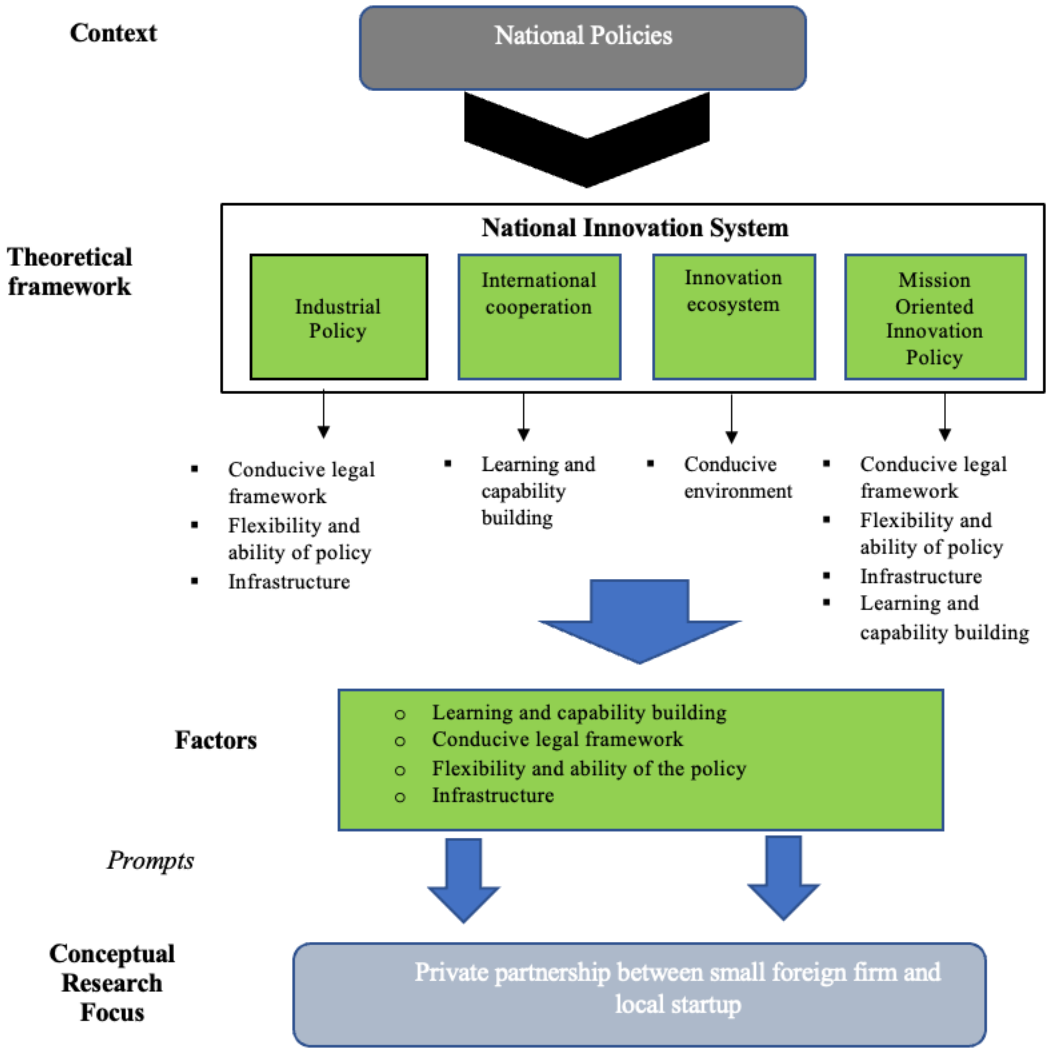


Figure 9: Conceptual framework 1

Source: Literature (Author's compilation)

The following section presents the operationalization, and the methodology used to analyze the growth of Rwanda's economy, examines the chronology of the policy adopted by Rwanda

to achieve rapid growth, and explores the Startup ecosystem in Rwanda and the role played by the national policy in supporting the growth of this sector.

3.2.6. Operationalization

The literature has identified a gap in the research on how national policies promote the flow of knowledge in African startups and several important factors that require further investigation. To operationalize the factors identified in the conceptual framework in order to facilitate the measurement, the factor have been framed as follows:

a. Conducive environment is a business-enabling setting that fosters the sustainable creation, growth, or transformation of enterprises. It includes key elements such as political stability, functioning financial markets, trade liberalization, adequate infrastructure, transparent legal and regulatory frameworks, and a corruption-free system (UNIDO, 2008).
b. Flexibility and agility of ICT policy: It is a policy that adapts quickly to the evolving technology landscape and digital economy needs. It focuses on responsiveness, innovation, and the ability to pivot in response to new challenges (Andriyani et al., 2024). Key features include:
    - Adaptability**:** Easily modified to accommodate technological and market changes.
    - Scalability: Supports the growth or contraction of ICT infrastructure as needed.

- Innovation-Friendly: Reduces barriers to foster rapid testing and implementation of new ideas.
- Regulatory Flexibility: Allows for experimentation within a non-prescriptive framework.
- Proactive Governance: Includes continuous monitoring to address emerging trends.
- Stakeholder Engagement: Involves all relevant stakeholders to ensure policy relevance.

c. Infrastructure is all the basic physical facilities needed for the operation of a society or enterprise , such as roads, electricity, and the telecommunications.
d. Learning and capability building is referred as processes through which individuals, organizations, or societies acquire, develop, and enhance the knowledge, skills, and abilities needed to perform tasks, solve problems, and innovate.

3.3. Methodology

This study employed a qualitative case study methodology to capture nuanced insights from Rwanda's experience of achieving rapid growth from an agriculture-based economy to an ICT-based economy through a series of policy interventions (Yin, 1994). We utilized primary data from semi-structured interviews and and secondary data from a structured review of official documents. To begin our observational study, we relied on secondary data collected

from various policy documents and official public reports that examine startup ecosystems at multiple levels, including national, regional, and international. This information provided a solid foundation for our research and offered valuable insights into the dynamics of the startup ecosystems. In addition to our secondary data, we gathered primary data by conducting semi-structured interviews that allowed open-ended responses, ensuring a comprehensive exploration of perspectives from key stakeholders. The interviews, involving face-to-face and online interactions, were conducted in January and February 2023. In total of fourteen individuals were interviewed, with sessions lasting 30 to 60 minutes. The stakeholders included government organizations such as ministries and policymaking institutions, academic and research organizations, private sector firms such as startups and incubators, and bilateral agencies. This approach allowed us to understand the topic comprehensively and gather valuable insights and perspectives from various sources. The selection of our interviewees reflected the criteria that the institutions be mandated to work with startups, that design policies be related to the startup ecosystem and growth, or regulate research on startup growth and innovation; and that international agencies be involved in the startup projects. We interviewed senior researchers, CEOs and project managers of startups/incubators, senior national policy officers in charge of STI startups involved in projects related to the startup ecosystem in Rwanda, and representatives of international agencies involved in startup projects. These stakeholders were deemed representative given their involvement in developing the startup ecosystem in Rwanda (*refer to Table 1 in Annex*).

Before the start of each interview, then interviewees were asked for their consent based on the interview guide which was provided formally. The interview guide consisted of an

introductory section explaining the study's purpose and requesting participant consent, and all interviews were recorded (Sturges & Hanrahan, 2004). The interviews were conducted conversationally with the help of approximately ten (10) questions, which are presented in the annex. These questions were focused on stakeholder perceptions of Rwandan national policy promoting international cooperation or collaboration and on the effect of international cooperation on the innovation capability of startups.

For our data analysis, we first transcribed the audio recording to text using Nvivo. We then utilized thematic analysis to examine the interview notes and compare them to the findings of our literature review. In the literature thematic analysis is defined as a qualitative approach that entails identifying and exploring repetitive patterns and themes within the data through a meticulous and iterative reading process (Sovacool et al., 2023). This approach allowed us to extract meaningful insights from the data and pinpoint, refine, document, and evaluate the key emerging themes. The keywords identified and how they are measured are as follows.

1. Conducive environment to observe if the legal framework provides the right conditions for foreign private companies by investigating whether the policy environment in Rwanda supports technology and innovation, offers investment incentives, and provides political stability and governance.
2. Flexibility and agility of policy to enable observation as whether the existing policies can change in accord with the situation and adapt to opportunity by assessing government willingness and ability to embrace technological advancements and innovative practices, and by identifying policy.

3. Infrastructure is used to assess the availability of basic physical facilities, such as roads, electricity, and the telecommunications.
4. Learning and capability building to detect the number of items of knowledge acquired in terms of human resource training; and by evaluating the number of graduates from TVET and higher education in the ICT sector.

To strengthen our analysis, we identified themes that appear ten times or more in our analysis, reflecting Ahearn (2014), who utilized word clouds to explore thematic output in an academic journal. Ahearn's approach is pertinent to our study as it enhances comprehension and accessibility by visualizing the transcribed interview responses. Using this approach, we separated phrases into main terms representing the keywords, using NVivo (version 14) via coding. This enabled us to identify relevant interviewee declarations within the raw data and systematically link them to pre-established codes and sub-codes developed during the keyword analysis process. Moving beyond these parameters, we used the indicators of the World Bank Enterprise Survey, which quantifies the infrastructure in terms of telecom investment, road investment, and electricity investment in Rwanda, to measure the success of the implementation of national policies in Rwanda.

3.3.1. The case studies

3.3.1.2. Choice of Rwanda

Rwanda has been chosen as a case because of its significant transformation to an ICT-oriented economy initiated by the development goal adopted in the 2000, as described in chapter 2.

3.3.1.3. Background of Rwanda

Rwanda is a landlocked country in East Africa with a population of approximately 14 million people. It is bordered with the Democratic Republic of the Congo, Burundi, Uganda, and Tanzania.

More than 30 years ago, Rwanda was one of the most fragile countries in the world. Up to 1 million people were killed in less than four months during the Rwandan genocide in 1994. After the civil war, the country's infrastructure, civil service, and social structures were devastated. The post-conflict Rwanda government, with the help of the international community, took a unique approach to rebuilding and reweaving part of the social fabric with policies and institutions that allowed the country to overcome past conflicts and fragility. Today, Rwanda is one of the fastest growing economies in Africa, outperforming many other countries, including fragile states, with strong and stable economic growth over a long period (Putzel et al., 2012; Redifer, 2020). According to World Bank's International Governance Indicators database, Rwanda fast-growing economy outperformed other countries in sub-Saharan Africa on four out of five criteria (World Bank, 2013): counter-corruption efforts, government efficiency, political stability, and the quality of the regulatory framework, and it was ranked 29 th out of 190 in the 2019 in the World Bank 'Doing Business' report. Rwannda GDP per capita (PPP) is estimated at US$ 774 and a real growth rate of 10.9 percent acording to World Bank 2021 data. But Rwanda main concerns is the high level of income inequalitu that cause obstacles to reducing extreme poverty (Sheriff & Muffatto, 2014b). However, to reduce poverty and develop its private sector, both formal and informal, the government

initiated a series of policies aimed at attracting private foreign investment and to pormote innovation.

3.3.1.4. National Policies for promoting startup and innovation in Rwanda

Rwanda's strategic policies have played a pivotal role in attracting foreign investments to its local economy, propelling growth and innovation. On that day, the government of Rwanda introduced several national policies influencing startup growth. Among 35 national policies identified, eleven were selected following Sheriff's (2014) approach by exploring the state and nature of the policies influencing tech startups growth *(refer to Table 9).* These chosen policies aim to promote startup growth, innovation and knowledge creation. The specific objective of these keys policies are as follows: (i) National Information and Communication Infrastructure (NICI) aims to establish Rwanda as a regional ICT hub, (ii) Vision 2020 offers incentives to reduce operational costs, attract talent, and promote diversity and innovation among firms investing in the country, (iii) Science and Technology and Information policy (STI) policy focuses on knowledge creation, fostering partnerships, supporting SMEs and startups, and advancing Science and Technology capacity in Rwanda (iv) Rwanda Economic Development and Poverty Reduction Strategy (EDPRS) provide framework for achieving the country's long-term aspiration of 2020 vision (EDPRS, 2007), (vi) Small and Medium Enterprise (SME) aims not only at job expertise development besides boosting particular value-added industries, aimed at reinforcing financial sector with provided tax extensions making it easier to secure investment funds to foster industrial expansion, (vii) National Industrial policy focus on domestic production for local consumption, improve Rwanda's

export competitiveness and the creation of an enabling environment for Rwanda's industrialization Science Techonology and Information, (viii) NST1 aims to promote inclusive economic growth and development in Rwanda through private sector engagement, knowledge, and natural resources, (ix) Investment policy the 2015 provides extends tax breaks and other incentives to investors; (x) Vision 2050, seeks to promote sustainable socio-economic development by 2030, (xi) Entrepreneur Development Policy empowers private sector entrepreneurs by creating an enabling environment that nurtures dynamism, innovation, and a willingness to take calculated risks—crucial ingredients for fostering a modern, sophisticated, and rapidly expanding economy, Partnership policy. These policies recognize the importance of innovation as a vital component for national progress and place emphasis on promoting inclusive economic growth, generating employment opportunities, and supporting private sector-led development in various growth sectors such as diversified tourism, local manufacturing, productive agriculture and agro-processing, and knowledge-based services and information and communications technology (ICT). For effective implementation plan, the government implemented (a) the Rwanda Development Board (RDB) in 2009 to accelerate the country's economic growth by promoting private sector growth and partnerships; (b) RISA to enhance access to Information and Communication Technologies and (c) the National Council for Science and Technology (NCST) established in 2017 to identify and promote innovative sectors for the nation's advancement.

Table 9: National policies promoting startup's growth and innovation

YEAR	*POLICY*	*PUBLIC INSTITUTION*
1998	NICI (I, II, III)	
2000	Vision 2020	
2005	STI policy	
2007	EDPRS	
2009	ICT policy	RDB
2010	SME policy	
2011	National Industrial policy	ICT Chamber
2015	NST1	
	Investment poliy	
2017		RISA
		NSCT
2020	Vision 2050	
	EDP	

Source: Author's compilation

3.3.1.5. Background of the Rwanda startup ecosystem

According to Sissel Hansen[15], "Rwanda is a small country, but by thinking bigger than its borders, it's quickly becoming an important African tech hub," (STARTUP Guide, 2021). Rwanda has been consistenly classified as one of the top countries in Africa for tech startups, for the following reasons: government support; infrastructure development; talent pool;

[15]Sissel Hansen is the founder of Startup Guide. Since 2014, she has created books for over 60 cities and regions in Europe, the Middle East, Asia, Africa, Latin America, and the US.
https://yourstory.com/2021/09/startup-guide-kigali-rwanda

access to capital; and favorable business environment (World Bank). Even though the Rwanda startup ecosystem is still young and growing, it is exploding with innovation and success. Rwanda's startup ecosystem encompasses public institutions and private sector such as startups, incubators, accelerators, private companies, banks and financial institutions; research institutions including public universities, private universities, and technical training institutions as well as non-governmental institutions like funding agencies and technical research institutions.

According to the Swisscontact (CSSC) Initiative (Report, 2019), over the last few years Rwanda had 403 startups. Today it has one of the highest ratios of new entrepreneurial support organizations (ESOs) per inhabitant worldwide.

The Rwanda startup ecosystem continues to grow gradually, with support from the government and international bilateral agencies and ventures. For example, the government's HANGA [16] Hubs Project initiative is backing thousand of young entrepreneurs.

In regard to the 2022 Global Startup Ecosystem Index by StartupBlink *(refer to Table 10)*, Rwanda is ranked the tenth best startup ecosystem in Africa and 84 globally(StartupBlink report, 2022), while CAR is not ranked in the report. Compared to CAR, Rwanda's fast-growing startup ecosystem is related to the policies adopted to nurture startups. However,

[16] Hanga is a program that offers transferring job-readiness skills and accelerator programs to new incubation hubs, and providing space and assistance for young workers and startups to embrace breakthrough technologies that boost productivity, competitiveness, and economic growth. More than 1,000 young entrepreneurs have been trained in Rubavu, Rusizi, Muhanga and Nyagatare (Friedrich Ebert Stufun, case study 2022). https://mastercardfdn.org/all/hanga-ahazaza/

there are many developing countries with national policies that are not being executed well due to the lack of shared understanding (as stated in MOIP) because the direction of where the country is going, like leadership, is essential for the different parts of the system to function effectively across the time.

Table[17] 10: Performance of Rwanda's startups ecosystem.

	Sector of activities of startup	**Startup index**	**Ecosystem rank in Africa**	**Ecosystem global rank**
Rwanda	*Fintech; *Transport; *E-health; *Logistics; *E-commerce & retail-tech; *Ed-tech; *Energy; *Agri-tech; *Restaurant-tech,e.g…	1.235	10	84
CAR		-	-	-

Source : Disrupt Africa report 2022 (Author's compilation)

The following section presents the results of this study based on the interview and the secondary data collection. It also includes the discussion and the conclusion of our study.

[17] Source: (Disrupt Africa report 2022, The state of startup in Africa Q2 2022 report, StartupBlink report 2022: Compiled by the author)
Disrupt Africa is an online media for news, information, and commentary on the continent's tech startup and investment ecosystem (https://disruptafrica.com)
StartupBlink is considered the most comprehensive map and research center for startup ecosystems worldwide.
(https://www.startupblink.com)

3.4. Results

The secondary data indicated that national policies aim to promote the flow of knowledge in African (Rwandan) startups are organized into four main themes as addressed in the MOIP. These are : (i) learning & capability building; (ii) conducive legal framework environment; (iii) flexibility and agility of the policy; and (iv) infrastructure to promote interfirm international cooperation in Rwanda *(refer to Figure 10[18])*. When answers on the open-ended questions "What type of national policies prompt international cooperation between domestic (Rwandan) firm and foreign firm?" are analyzed, interviewees deliberately and consciencely mentioned the factors that are consistent with the areas of emphasis in the MOIP, which are also outlined in the Rwandan National Development Policies' .

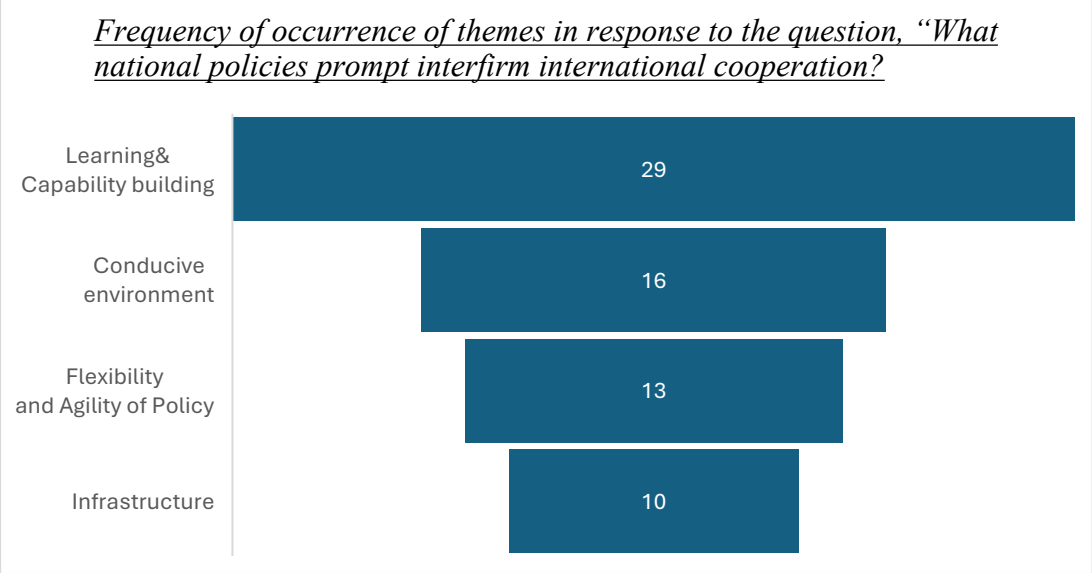


Figure 10: Frequency of occurrence of terms in response to the question, "What national policies prompt interfirm international cooperation?

[18] Figure 10: Frequency of occurrence of the terms in subject responses to the question regarding whether Rwandan national policy prompts interfirm international cooperation (by the author using Nvivo).

Source: Author's compilation from interview *(Nvivo result*)

The following subsection presents the interpretation and perception of the participants regarding each keyword.

3.4.1. Flexibility and agility of the policy

Regarding elements of the innovation policies that trigger international interfirm cooperation, a number of participants stressed the importance of flexibility and agility of the policies in promoting the introduction of new technologies in Rwanda. In addition, they believe that policy's openness, flexibility, and agility are key factors in attracting private foreign companies to invest in Rwanda, especially since many other African countries have rigid policies. As some respondents mentioned

- *"I think Rwanda has already been a successful case in that regard. For example, the Zipline case, the way it was introduced, is an example of an agile policy in which different companies are just coming to try things and mostly on emerging technology. So, I would say that our policy is in favor of enabling innovation and the introduction of new technology."*
- *"Moreover, firms come to Rwanda because of the openness of the national policies. For instance, if the environment is opened, it encourages competitiveness and attract foreign investment."*

3.4.2. Conducive legal framework environment

Most participants responded that Rwanda's innovation policies fostered cooperation between local startups and foreign firms without hindering private investment from abroad. They underlined the necessity of a conducive legal framework environment in Rwanda was, its key role in prompting

interfirm international cooperation, and its record contributing to attracting private investment. One responded mentioned:

- *"Yes, the national policies of Rwanda promote interfirm international partnership, attracts investment, and promotes the creation of companies; Rwanda is ranked 3rd in term of ease of doing business in Africa. It is easy for a foreign citizen to open a company in Rwanda. One good example, Norrsken, a non-profit impact ecosystem connecting founders with the capital, knowledge, and networking they need to make saving the world their business. Rwanda is among the countries with a good policy that may protect the investment."*

However, other interviewees also believed that politics is the driving force behind Rwanda's conducive environment. They highlighted the crucial role of public institutions in implementing policies and connecting startups with foreign companies.

- *"First, in Rwanda, a conducive environment is the foundation for attracting private foreign firms to invest in local startups. The government plays a crucial role by ensuring security and providing a guarantee that encourages foreign companies to relocate from their home countries to Rwanda."*
- *"So yes, in term of attracting private investment, some public institutions such RDB have played an essential role in creating a platform that connects private foreign firms with local startups. Similarly, RISA drives Rwanda's digital transformation by promoting the use of innovative technologies and ICTs to develop other sectors. However, all this depends on the maturity of the startup ecosystem."*

Moreover, the secondary data analysis corroborates the interviewee's answers, revealing that Rwanda's business climate demonstrates a solid commitment to attracting private investments,

with a significant amount of foreign investment attracted between 2015 and 2019 (RDB report, 2019) (*refer to Figure 11*).

However, one respondent noted that the success of private investment was more dependent on the maturity and nature of the ecosystem in Rwanda than the national policy.

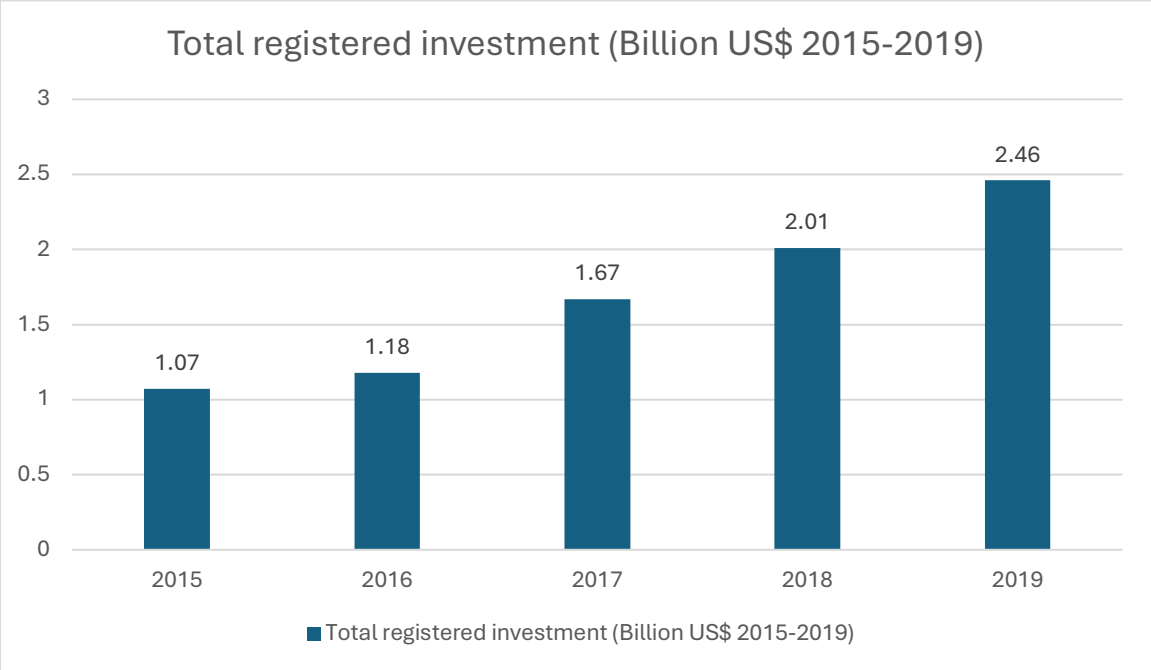


Figure 11: Total registerd investment recorded by RDB between 2015 and 2019

Source: Author's compilation

3.4.3. Infrastructure

During the interviews, it was observed that Rwanda's national political infrastructure has played a crucial role in shaping the country's investment climate, leading to favorable conditions for economic growth. One key aspect highlighted by most participants is *"the enabling policy for infrastructure implementation and security as essential requirements".* Additionally, data from

the World Bank reveals Rwanda's substantial investments in telecommunications, electricity, and road infrastructure between 2007 and 2020 *(refer to Figure 12)*.

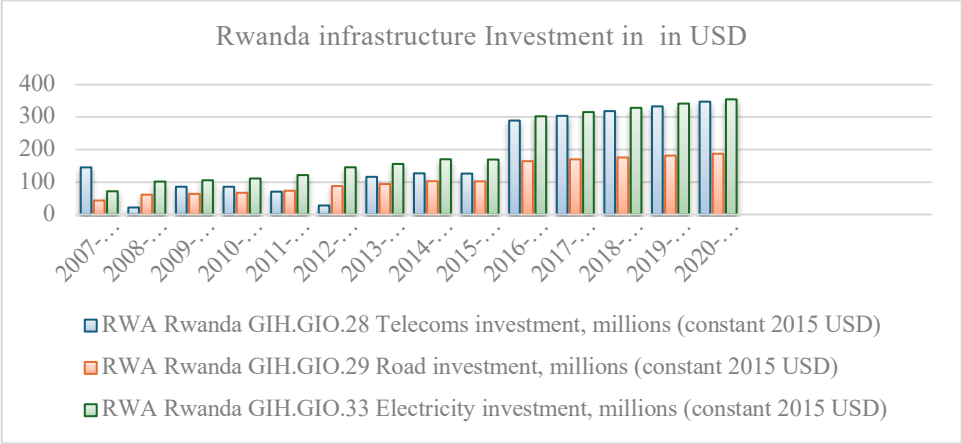


Figure 12: Trend of Rwanda investment in Telecommunication and Electricity and Road between 2007 and 2020

Source: Enterprise Surveys[19] (Author's compilation)

3.4.4. Learning & capability building

According to most participants, the national innovation policy plays a crucial role in the growth of startups. Startups in developing countries often face challenges in obtaining funding or overcoming the lack of necessary skills for market success. The policy environment has facilitated international cooperation and collaboration, improved startups' capabilities through specialized training, and provided some funds. Respondent observe that "*Most startups struggle to raise funds, and incubators also face this issue. Hence, Rwandan policies aim to support the entrepreneurship training of young people in the area of ICT and provide some funds to startups. In addition, the policies have been building the startup's capability and providing some funds.*"

Moreover, reports from RDB and the Labour Market Information System show a significant increase in TVET ICT graduates between 2010 and 2020(LIMS report, 2010; RDB report, n.d.-b)

[19]www.enterprisesurveys.org

confirming interviewee answers that the national policy facilitates learning and capability building *(refer to 13 Figure*).

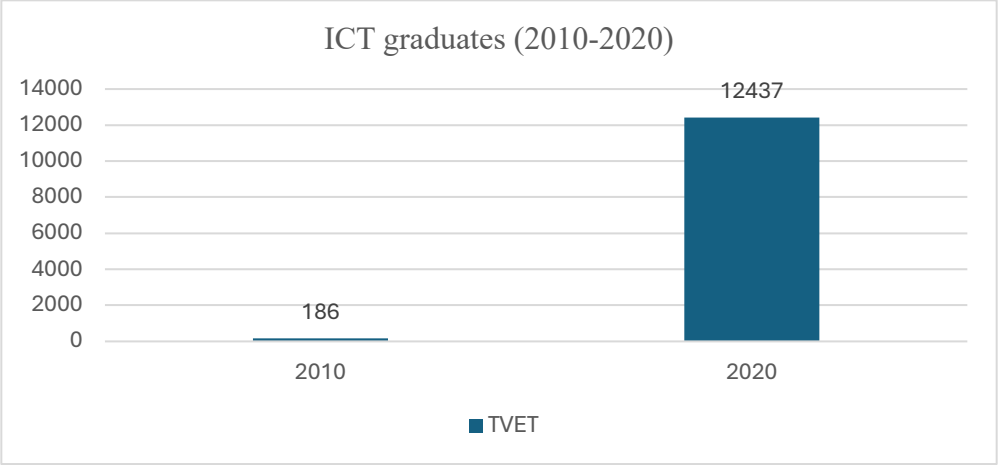


Figure 13: number of TVET ICT graduate in Rwanda between 2010 and 2020

Source: RDB report 2021 and Labour Market Information System (LMIS) (Author's compilation)

The above findings show that the interviewees highlighted key elements mentioned in MOIP. MOIP argue that countries seeking economic development should create markets that increase business expectations for future growth opportunities, driving private investment. This confirms our view that national policy has effectively fostered international partnerships between private foreign tech firms and tech startups in Rwanda, transforming the organization of the economy. The interview also demonstrates that different government stakeholders shared the same vision by confirming that the national policy stimulated knowledge flow in startups by partnering with small-scale foreign tech companies.

The previous chapter 3 shows that Rwanda has some distinctive policy interventions to transform the economy from agrarian to knowledge-based. All these trends presented above have been achieved, and this has also been a conscious effort made by the policymakers and the interviews

and keywords have proven this achievement. In the following chapter, we focus on Japan and Rwanda at micro level. This consists of looking at the collaboration between a small-scale Japanese tech firm and a small-scale Rwandan tech firm in software development to understand how this collaboration is established and how information is transferred between the two companies.

Chapter 4: Analysis of the impact of International Collaboration on the Innovation Capability of tech company in Africa - Evidence from Japanese firms' collaboration with African tech company in Rwanda.

4.1. Introduction

International collaboration is considered essential for most contemporary enterprises (Gulati 1998; Harrigan 1988; Kale, Dyer, and Singh 2002; Park, Mezias, and Song 2004). Many companies in developed countries adopt international collaboration as a commercial strategy for sustaining resources (Eisenhardt & Schoonhoven, 1996), partake in uncertainty (Kogut, 1988), obtain valuable information about the market (Henderson & Cockburn, 1994), decrease cost of product development (Henderson & Cockburn, 1994), enhance technological capabilities (Powell, et al. 1996) and develop reliability (K. Singh, 1996).

Most of these studies, however, have focused on capabilities development of large-scale firms in developed countries and emerging economies (Fu et al., 2022a; Yao et al., 2013; Zhao et al., 2022), few on developing countries.

In the last decades, small-scale firms from developed countries aiming to expand their markets or develop new products, have opted to outsource some of their services by collaborating and investing in tech firms in Sub-Saharan Africa (SSA). This collaboration requires frequent and intensive interaction between firms from developed and developing countries as it involves knowledge creation and transfer (McDermott & Corredoira, 2010). An understanding of this interaction leading to knowledge creation and transfer between small-scale tech foreign firms from developed and developing country is different from the traditional model involving multinational

corporation to their local firms in the host because small-scale firms lack resources and technology. The existing studies on knowledge transfer in developing countries focus on market-entry alliances, which involve transfer of local market knowledge and technological/managerial knowledge between foreign and domestic firms (Okonkwo & Road, 2018). This particular literature emphasizes the importance of local developing-country-based partner firms possessing cognitive characteristics, such as absorptive capacity, to acquire knowledge and technology from foreign developed-country-based partner firms (Osabutey, Williams, and Debrah, 2014). Nevertheless, discussion of the impact of international collaboration on the innovation capability of small-scale firms in developing countries remain rare in the literature which points to the need for analyzing the collaboration between foreign firms from developed countries and tech companies in developing countries. According to the African tech Startups Funding Report 2022, published by Disrupt Africa Report of 2022, foreign investment in African startups (balance of payments basis, net, inflows) reached US$ 2.15 billion in 2021. This paper contributes to existing by understanding how international learning promotion and provides policymakers with insights into effective fostering of international collaboration. It elucidates how African small-scale firms can contribute to global knowledge through interactions with small-scale firms from developed countries.

This study examines how this new mode of international collaboration between small-scale tech firms from developed and developing countries is developed and the converse effect of this collaboration on the small-scale firms. It looks at emerging technology such as software development in particular. The impact of international collaboration in building tech firm capabilities in developing countries in Sub-Saharan Africa has been largely neglected in the national innovation system (NIS) literature. Addressing this gap, innovation system concept is

used to observe the interaction between firms leading to capability building in developing countries where institutional capacities for innovation be lacking and where development take place in the context of politically contested relations between government, industry, and civil society) ((Arocena & Sutz, 2000; Watkins et al., 2015).

Our findings suggest that the interaction between Japanese firms and tech firms in developing countries offers valuable insight on firm capability building in the case of technology.

The paper is organized as follows: First, a review of the literature concerning the innovation system, resources, knowledge, and international collaboration and their influence on the innovation capability of tech firms is presented, including research questions and the conceptual framework. Second, the methodology is described. Then, the case of partnership between Rexvirt Communication and WiredIn in software development is examined. Finally, the results are presented.

4.2. Theoretical background

Studies on innovation systems had not focused on the role played by international small-scale firms' information exchange and collaboration (between tech small foreign firms from developed and developing countries). Such collaboration between firms is essential for innovating new product development in order to keep the firm competitive in the market. While the effects of international collaboration driven by multinational companies (MNCs), on the innovation and learning process in developing countries have been widely analyzed (Pietrobelli & Rabellotti, 2011), few studies have examined the how learning process is achieved in the collaboration between small-scale firm developed countries' and firm in developing countries.

Those studies on international learning exchange have mainly focused on global value chains (GVC), suggesting that firms in less developed countries learn and innovate in proportion to their participation in GVCs (Gereffi, 1999; Giuliani et al., 2005; Humphrey & Schmitz, 2002; Pietrobelli & Rabellotti, 2011, 2006; Raphael Kaplinsky, 2000). That process of learning through collaboration is effective because it empowers less developed nation firms to comply with general GVC requirements related to product quality, delivery time, process efficiency, and environmental and social standards (Pietrobelli & Rabellotti, 2011).

Studies on international cooperation observed firms engage in international collaborative activities with other firms or institutions to access complementary resources and expertise, share costs and risks, enhance market access, and achieve economies of scale and scope (Aschhoff & Schmidt, n.d.; Narula & Hagedoorn, 1998).

However, international collaboration between small-scale firms in developing countries and small-scale firms from developed countries differs from the interaction of firms within a GVC, as it involves small-scale firms rather than MNCs. International small firm collaboration gives small-scale firms access to new markets for selling products, and opportunities to gain knowledge and develop learning, which lead in turn to innovation.

Research on international exchange and collaboration in developed countries and emerging economies (Aïssaou et al. 2020; Fu et al. 2022a; Yao et al. 2013; Zhao et al. 2022), highlight how international collaboration promotes innovation by arguing that it facilitates resource acquisition, increases knowledge diversity, and improves the dynamic capabilities of local partners. On other hand in less developed countries, emphasizing that firm increased reliance on collaborative arrangements with foreign firms from developed countries to access knowledge and build

capacities (Osabutey et al., 2014). Additionally, these studies mainly concentrate on knowledge flow from parent companies to subsidiaries (Dunning, 2001; C. S. Kogut & Mello, 2017), providing limited consideration for knowledge exchange between small-scale foreign firms in developed nations and small-scale domestic firms or within small local firms themselves in sub-Saharan Africa.

Given the scope of this study, we focus on one main theoretical framework and two theoretical sub-frameworks essential to the capability building development of private firms: (a) national innovation system ; (b) learning intent and the absorptive capability; and (c) innovation capability. The following section will survey the literature on international collaboration and its relationship to innovation capability.

4.2.1. Innovation systems

4.2.1.1. Innovation systems in developing countries

The national innovation system is defined as the interactions between public and private firms, universities, and government agencies that facilitate the production and dissemination of information and technology within national borders (Lundvall, 1992). Since the 1980s, this framework has enabled the study of relatively new themes in science and technology, including the production of technological knowledge, the measurement of technological flows, the analysis of national technological policies, and broader themes related to labor markets, the educational environment, and innovation clusters between producers and users of technology. In this regard, our study uses the national innovation system as a framework to foster interaction between WiredIn and Rexvirt, leading to the creation of software under the influence of public institutions

such as RURA, RDB, MINICT, RISA, as well as research centers and international agencies like JICA.

During its early stages, the literature on innovation systems primarily focuses on the nation-state (Freeman, 1995; Lundvall,1992). This literature emphasizes catching up, fostering capabilities through collaborative efforts among diverse organizations, and emphasizing a collective learning process at national level. Moreover, this literature argues that companies do not operate in isolation regarding learning and innovation; instead, knowledge is generated and shared through interactions between various actors such as businesses, customers, universities, and government organizations within the system (Iizuka & Soete, 2013).

Existing literature on innovation systems indicates that applying this framework to developing countries is not straightforward for several reasons: (i) the innovation process differs from developed countries where knowledge is created differently:incremental innovation and absorption of knowledge are foundational in developing countries whereas more R&D-based in developed countries (Prokop et al., 2021). In this context, knowledge transfer occurs mainly via catching up supported by foreign direct investment and multinational corporations(Awate et al., 2012; Fu & Gong, 2011; Kumaraswamy et al., 2012; J. A. Mathews, 2006); and (ii) external knowledge,& and technology are crucial and play essential roles. However, with the rise of partnerships between small-scale tech firms from developed and developing countries, there is a need to understand how knowledge transfer occurs in these interactions.

Furthermore, the literature on innovation systems in developing countries stresses the importance of innovation capability by suggesting that firms in these countries could improve their capability by catching up (Fan, 2006). This stream of the literature consists of two sub-streams: (i) the

technical dimension, which focuses on knowledge aspects and organizational absorptive capacity to produce innovative products (Azabadi et al., 2012; Cheng et al., 2016; Cohen, 1990; Galanakis, 2006; Gamal, 2011; Hansen & Birkinshaw, 2007; Hottenrott & Peters, 2009; Liao et al., 2007; Neely & Hii, 1998; Roper et al., 2008; Zou et al., 2016), and (ii) the financial/commercial dimension, which explores innovative product commercialization and financial generation (Encaoua et al., 2006; Hall & Mairesse, n.d.; Hottenrott & Czarnitzki, 2011; Hottenrott & Peters, 2009; Madsen & Smith, 2008; Romijn & Albaladejo, 2002; Tesfaye & Kitaw, 2018).

However, some critics argue that a heavy focus on local networks can limit learning processes and overlook global connections (Iizuka & Soete, 2013). Similarly, (Ernest, 2002, p.500) observed the lack of attention to the international aspect of NIS as many developing nations do not possess extensive knowledge(intellectual capital) and rely heavily on external sources of knowledge (Ernest, 2002). He recommends that international linkages need to pave the way for the growth of a strong NIS (Ernest, 2000). Despite these critics we argue that innovation system is the main comprehensive framework that can be used to analyze interaction between small scale firms from developed and developing countries.

4.2.1.2. Innovation system and institutional environment

According to Lundvall (1992), the innovation system serves as a comprehensive framework fostering interaction among its components, leveraging research, science, technology, and innovation to drive societal development. Studies highlighted the crucial connection between the institutional environment and the innovation system, emphasizing their role in facilitating knowledge transfer. These studies argues that successful innovative organizations depend on factors such as quantity, quality, and speed of their development (Prokin et al. (2015). These

factors, in turn, are influenced by the innovation system and its two main groups of factors: institutional and non-institutional. For instance, (i) the non-institutional factors include all the resources, technologies, and processes involved in the innovation cycle, from production to sales and marketing, and (ii) the institutional factors which is composed of series of legal systems, government governance, economic and social environment used to establish the basis of production, exchange, and distribution. In short, the institutional environment is the foundation for forming the NIS (Nelson and Winter, 1982.p.145).

Other studies observed that to rethink the growth approach from a resources-based economy to a knowledge-based economy; stakeholders need to prioritize policy institutional framework as key facilitating instruments to institutionalize the production and use of knowledge for development (Amsden, 2001; Etzkowitz & Dzisah, 2008).

Institutional environments (which includes the political, social, and legal regulations that establish the framework for creating and distributing economic activities) are a key factor of the growth of many countries around the world. In a strong institutional environment, a business receives assistance from a successful market mechanism (Meyer et al., 2009).

4.2.2. Resource-based and learning intent as motivational factors

Studies on international collaboration largely argue that international collaboration allows firms to discover and acquire rare, non-replicable resources and combine them their own capabilities to enhance innovation capability and competitive advantages (Yamakawa et al., 2008). Most studies have focused on two approaches for understanding how firms attain resources and achieve competitive advantage through resource building. The resource-based view (RBV) theory argues that a company's growth depends on the range of its resources (Goumagias et al., 2022), while the

knowledge-based view emphasizes knowledge creation and transfer through collaborations based on partners' resource configurations and characteristics (Hegde & Hicks 2008; Singh 2004).

However, knowledge creation in international collaboration is influenced by learning intent, which defines a firm's willingness to obtain knowledge from its partner(Hamel 1991, p. 90). Studies suggest that intentional design significantly enables successful knowledge transfer between firms via alliances/investments in learning mechanisms (Hamel, 1991; Laure Dikmen, 2016; Norman, 2004; Pérez-Nordtvedt et al., 2008). Therefore, without learning intention, alliance partners are less likely to invest in learning mechanisms and resources for learning processes via alliances (Inkpen, 1998).

Moreover, while the learning intent of a receiving firm enhances the probability of inter-firm knowledge transfer, it is equally important to recognize that the source's motivation to share knowledge has been consistently acknowledged as a significant determinant factor in this process (Lawson & Potter, 2012; Simonin, 1999; Szulanski, 1996). Szulanski (1996) highlighted the 'lack of motivation of the source' as a significant obstacle to knowledge transfer.

Despite the use of various terms to describe a knowledge source's motivation, there is a consensus that the source's willingness to transfer knowledge plays a pivotal role in determining the extent of knowledge transfer.

4.2.3. Innovation capability

In the previous literature, most early studies widely used catching-up literature to study innovation capabilities in countries and firms (Kim, 1997). These studies state that catching up is one of the significant opportunities for firms in developing countries to reduce the technological gap and catch up with advanced economies (Fan, 2006). Catching up theory in literature can be divided into three strands of literature.

The first strand examined catching up, achieved via attracting FDI and MNC in emerging and developing countries, with government intervention through national policy (Awate, Larsen, and Mudambi 2012; Fu and Gong 2011; Kumaraswamy et al. 2012; Mathews 2006). Fan (2006) argues that catching up is the main means by which firms can develop their innovation capability through interacting with external agents. The above studies provide evidence that innovation capability is essential for an enterprise with resource-based or dynamic capability to get a competitive advantage. Innovation capability is defined as an activity that introduces and applies novel ideas or technologies to produce a new product or service, in turn generating new added value through the value chain (Yam et al., 2011; Zawislak et al., 2012). However, none of these studies addressed how firms acquire capabilities, leading to questioning how learning takes place.

Furthermore, studies have identified three types of innovation capability:

(a) innovation capability as a technology capability used to develop the economic value of a firm's products and services (Yam et al., 2011; Zawislak et al., 2012) by means such as by enhancing the quality of a product or empowering higher levels of productivity and commercialization.

(b) innovation capability as the knowledge that positively affects a firm's strategy or decision-making (this consists of learning capability, i.e., the level to which the members of an organization can integrate change into their practice) (Yam et al. 2011); or absorptive capacity, i.e., the ability of a firm to acquire, understand, and use knowledge needed for the creation of innovative products (Patterson & Ambrosini 2015; Santoro, Bresciani, and Papa 2020); and

(c) innovation capability as marketing capability that enhances the sales performance of a firm. (Kim & Jeon, 2016; Küster & Vila, 2011).

The second strand of the literature on catching up, related to industrial catching up, emphasizes the importance of knowledge diffusion and technological leapfrogging (Acemoglu et al., 2006; Ernst, 1998; Lee & Lim, 2001; Malerba & Nelson, 2011; Yu et al., 2016).

The third strand of the literature on catching up has emerged recently, with the advent of startups (Colombo & Piva, 2008; Davila et al., 2003; Mustar et al., 2008; Segarra, 2020) and leapfrogging (Davison et al. 2000; Gallagher 2006; Watson 2008).

The above studies show a diverse trend in the literature regarding knowledge transfer in developing countries. There is a shift in the debate surrounding the impact of foreign firms on international information exchange within developing countries. The existing literature argues the one-directional flow of knowledge that knowledge transfer occurs mainly through catching up, supported by MNEs or FDI, and that firms in developing countries learn based on their participation in GVC to develop innovative capabilities, with limited consideration given to the knowledge transfer between small-scale firms from developed and developing countries.

Furthermore, current studies emphasize the importance of startups in facilitating knowledge diffusion through leapfrogging in developing countries.

However, none of these discuss how knowledge transfers occur between small-scale tech firms from developed countries and those from developing ones in African countries. Therefore, this study focuses on understanding the dynamics of knowledge transfers between small-scale firms as they relate to innovation capability development in an African country.

4.2.4. Research questions

The literature review in the previous section unveiled important discoveries and identified areas that require further research. First, the existing literature primarily focuses on the effects of foreign companies, especially multinational corporations, on the innovation and learning process of their

parent firms in developing countries. The review suggests that firms in developing countries could enhance their innovation capabilities by engaging in incremental learning and utilizing foreign direct investment and multinational corporations to facilitate knowledge transfer to parent firms, ultimately aiding employment generation (Awate, Larsen, and Mudambi 2012; Fu and Gong 2011; Kumaraswamy et al. 2012; Mathews 2006). However, collaboration leading to knowledge creation between small-scale firm from developed and developing countries differs from that of MNCs operating in the same regions, as small-scale firms lack the resources, organizational structures, technologies, and goals possessed by MNCs.

Second, the literature indicates rethinking the growth approach from a resources-based economy to a knowledge-based economy by prioritizing of policy institutional framework as key facilitating instruments to institutionalize the production and use of knowledge (Amsden, 2001; Etzkowitz & Dzisah, 2008). This presents different context for institutional environment to support the creation of knowledge in African as small-scale represent around 90% of businesses (UNCTAD, 2022).

Based on the above understanding, this paper address this primary question:

- How does the new model of international collaboration between small-scale tech firms from developed and developing countries develop?

The questions supporting to the primary question:

- What was the impetus for initiating the collaboration?
- What are the effects of this new mode on small-scale firms in developed and developing countries?
- What supporting policy system had been designed intentionally to enable this kind of collaboration?

- What role(s) did international organizations play in this new model of collaboration?

4.2.5. Conceptual framework

This study adopts the innovation system framework for its examination of international collaboration. Use of this framework can foster interaction among institutions, enabling the facilitation of knowledge flow among participants. I hypothesize that this new model of collaboration promotes knowledge creation.

Figure 14 shows the relations among local tech small-scale firms, international small-scale firms, Rwanda's national innovation system (NIS), and the institutional environment. It illustrates how international collaboration between two small-scale tech firms takes place within the NIS, under the influence of the institutional environment. The downward arrows from the companies in developed and developing countries to the NIS represent the dispatch of engineers selected by the two companies to form a team to develop a software product. The reverse arrow from the NIS to the innovation capability of small-scale firms in developing countries represents the learning process, highlighting the impact of collaboration on the company's human resource capabilities and the significance of innovation capability within that collaboration.

The institutional environment is the most crucial component of the national innovation system ecosystem. It establishes the organizational and governance structures and the legal, institutional, and primarily financial framework that shape the operation of innovation ecosystems at all levels. The arrows from the institutional environment illustrate its essential role in enabling the national innovation system: the institutional environment provides a conducive environment where companies have access to the infrastructure (ICT infrastructure, electricity and banks) essential for their functioning. The institutional environment also helps companies within the National

Innovation System (NIS) by increasing their awareness of the regulatory framework, providing access to relevant information, and ensuring they benefit from policy coherence and transparency in enforcing regulations and policy initiatives. We hypothesize that by providing these enabling conditions, the institutional environment supports the good functioning of the national innovation system.

Figure 14 illustrates the international collaboration in the context of the theorical framework of this study.

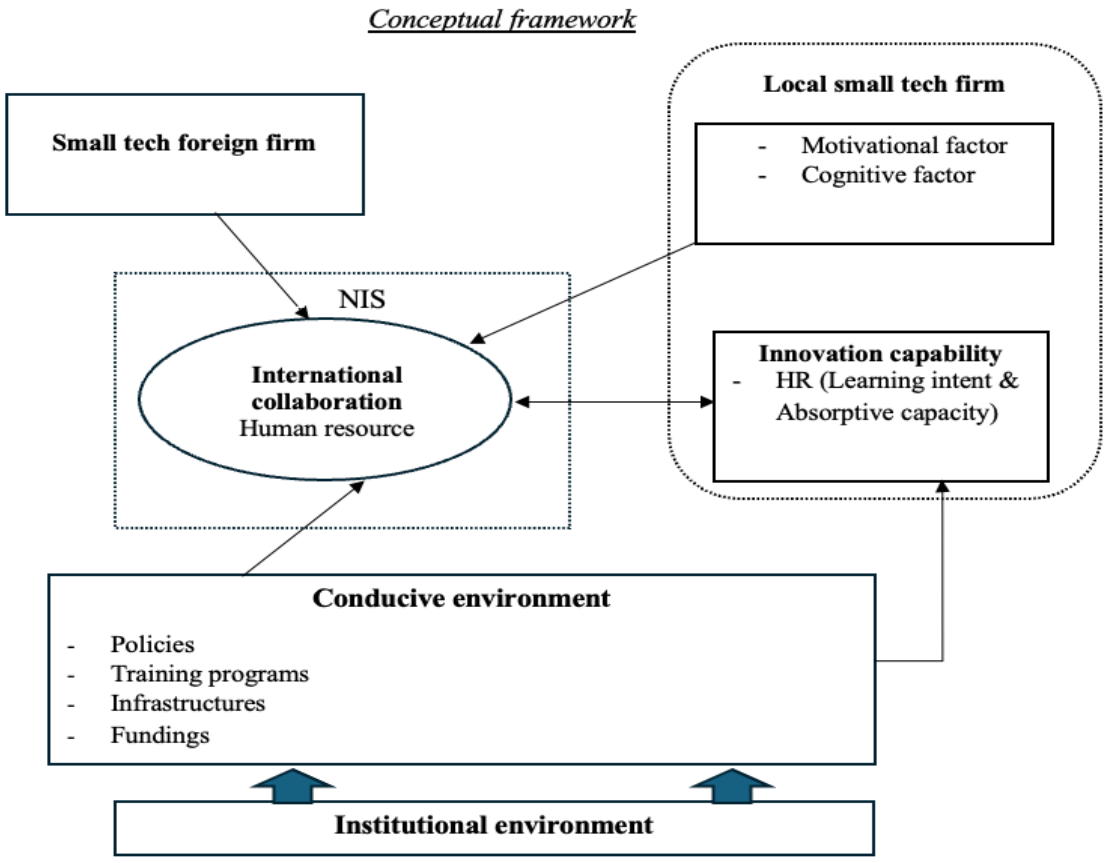


Figure 14: Conceptual framework 2

Source: author's compilation based on the literature review

4.2.6. Operationalization

The literature has identified several important factors and gaps in research on international collaboration between private foreign tech companies that help develop innovation capability in developing countries. One of the most significant factors is the lack of a clear understanding of the influence of international collaboration on the innovation capability of small-scale tech firms from developing countries when they enter into international collaboration with small-scale firms from developed countries. This study distinguishes one main factors that have an influence on the innovation capability of firms in developing countries. These factors are mainly related to knowledge transfer at the firm level (Easterby-Smith et al, 2008), and have been categorized into three groups: (a) factors related to the nature of the knowledge (Simonin, 1999; Zander & Kogut, 1995; Inkpen, 2008); (b) factors related to provider knowledge and receiver knowledge (Hamel, 1991; Szulanski, 1996; Lane & Lubatkin, 1998; Perez-Nordtvedt et al., 2008; Lawson/Potter, 2012); and (c) factors related to the characteristics of the interaction between the knowledge source and the receiver (Hansen, 1999; Bengoa & Kaufmann, 2016).

Another critical factor is the institutional environment's role in enhancing human resource capabilities for driving innovation within small-scale tech companies in developing countries, encompassing policies providing favorable conditions for international collaboration between private foreign firms and product development. Further, it has identified the essential factor of the environment supports the growth of small-scale companies through specialized tailored training and allocation of funds to SMEs.

The following section provides an overview of the ICT outsourcing business in Rwanda, including the number of companies and their founding dates. This analysis aims to examine the connection

between these companies and the implementation of key policies. Additionally, it explores the composition and dynamics of the ICT ecosystem in Rwanda from the firm level case..

4.3. Context of the study

4.3.1. Overview of ICT outsourcing business in Rwanda

Software outsourcing is increasingly becoming a critical component of firms' business strategies to enhance global competitiveness(Wahab & San, 2018). It offers cost-effective solutions, access to skilled talent, scalability, operational flexibility, and opportunities for innovation and growth. Rwanda has been striving to become a digital hub in Africa by implementing policies that promote the creation of ICT-focused entities. Between 2000 and 2015, Rwanda's ICT sector experienced significant growth partially due to the introduction of the Vision 2000 initiative policy, science technology and information(STI) policy and small medium enterprise SME policy. Studies observes that rose in the number of private companies' creation from 583 to 91513 (Ndagijimana et al., 2016), is due to the policies reform introduced by the government (*see Figure 15).* The history of Rwandese software development companies engaging in software outsourcing shows that most of the companies were established after the implementation of STI and (SME) policies (*see Table 11*). According to the Rwanda Development Board (RDB)[20], Rwanda has emerged as a primary destination for outsourced international IT businesses, with companies from both developed and emerging economies actively pursuing information technology outsourcing. Outsourcing destination guide report[21] of 2022, highlights that the outsourcing landscape in

[20] https://rdb.rw/investment-opportunities/gbs/
[21] https://www.outsourcing-destinations.org/portfolio/outsourcing-destination-guide-rwanda/

Rwanda comprises numerous companies specializing in software development ranging to eService solutions, and integrated mobile shelving system etc...

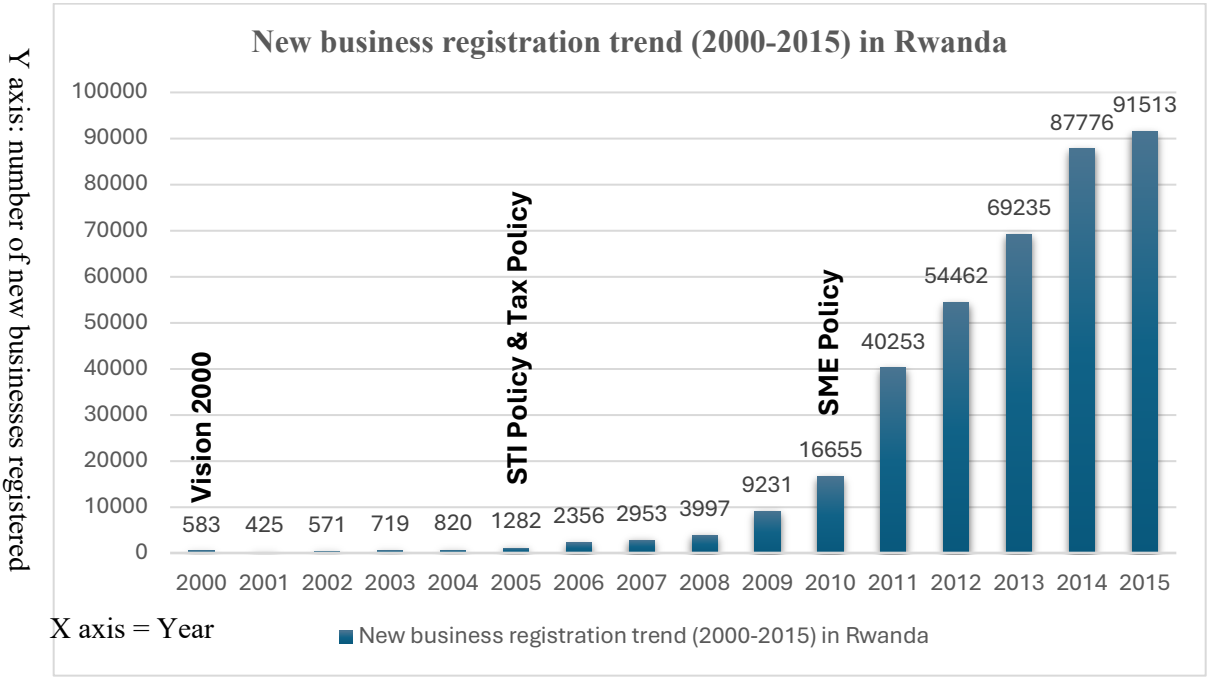


Figure 15: New business registration trend (2000-2015) in Rwanda

Source: Author's compilation based on Office of Registrar General's (ORG) data (2015)

Table 11 below presents information on List of IT outsourcing SME companies in operation for over 4 years, including year of creation, services offered and the countries of their outsourcing partners.

Table 11: List of some IT outsourcing SME companies in operation for over 4 years

Company	Year of creation	Service delivered	Partner countries
WiredIn	2011	Software development	Japan
Sylver Rwanda IT	2011	Software development	Rwanda
Hexacomb	2013	Software development	Rwanda
Impact Technology	2013	Network solutions, software licenses supplying, and SaaS subscription management.	South Africa

eVolve	2014	Software development	UK
Sacris	2015	Software development	Uganda
Skyline Digital	2015	Software development	Rwanda
Data System Limited Rwanda	2016	Software development	Rwanda, Burundi and Ghana
GorillaTech Ltd	2017	UI/UX designs and websites creations for clients	China
Code of Africa	2017	developer as a service	Rwanda
CrimsonLogic	2018	eService solutions	Singapore
Move	2018	Mobility solutions	South Africa

Source: ICT outsourcing destination 2020 (Author's compilation)

4.3.2. Overview of the Rwanda ICT innovation ecosystem

In the last decade, the ICT ecosystem of Rwanda has contributed to national socio-economic performance through income generation and the provision of services and jobs to the Rwandan population as discussed in chapter 3. Based on the government goal to transform Rwanda into a leading ICT hub, by: (a) building a critical mass of educated and skilled information technology (IT) literate human resources; (b) fostering a national innovative culture by initiating appropriate legal, institutional, and policy changes to promote a research and development culture; and (c) developing advanced technological capabilities and expertise in selected niche areas; Rwanda government has created an conducive environment where different stakeholders interact to create knowledge and innovation. ecosystem is composed of several stakeholders both at the national and international level.

The country has been consistently classified as one of the top countries in Africa for IT and the home of smart Africa initiative, for the following reasons: government support; infrastructure development; talent pool; access to capital; and favorable business environment (World Bank, 2007). The Rwanda ICT ecosystem illustrated by Figure 16 involves various stakeholders,

including (i) telecommunications providers and hardware manufacturers who provide infrastructure, (ii) software developers such as WiredIn, (iii) startups and incubators and (iv). policymakers like MINICT[22], RISA[23], RDB, RURA[24], and NCST[25] are responsible for regulation and policy implementation and providing essential financial resources for developing small-scale companies. Additionally,(v) research institutions like AIMS[26], Carnegie Mellon University, the African Leadership University, and EAIFR(East African Institute for Fundamental Research) contribute human resources to the ecosystem. At the same time, (vi) international agencies like JICA[27], KOICA[28], Expertise France, and GIZ[29] offer funding and specialized training to human resources, and (vii) foreign ICT firms (Rexvirt) that engage in partnerships with Tech SMEs (WiredIn), and startups in Rwanda. For instance, among the tech SMEs is WiredIn Ltd, a software development company that engages in software development business in collaboration with Rexvirt Communication from Japan. All, these stakeholders collectively play a crucial role in driving innovation, economic growth, and societal advancement.

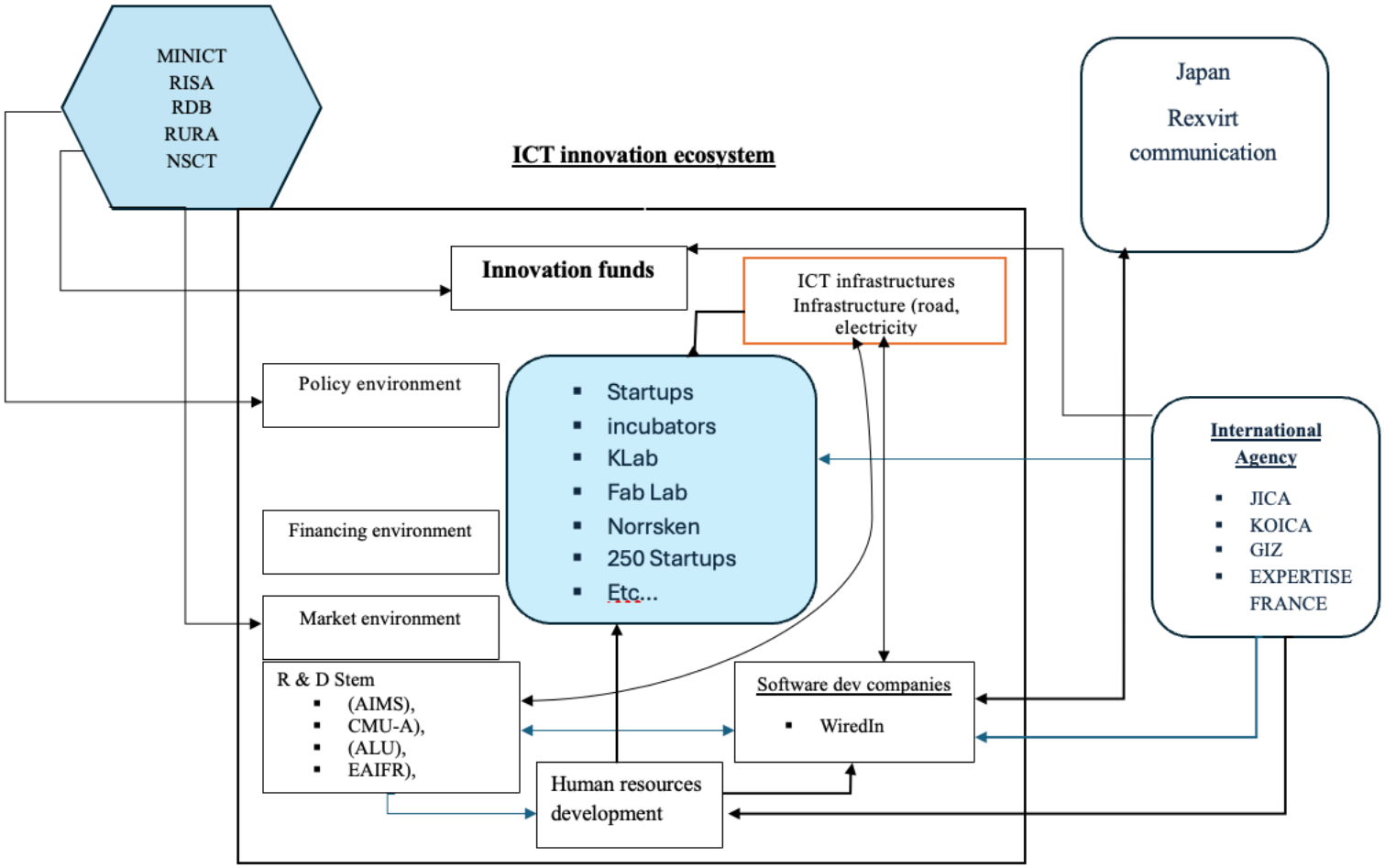
Despite Rwanda's success in transforming into a middle-income economy through ICTs, challenges persist in ICT development. Large firms like mobile operators have invested in infrastructure, yet broadband usage remains low, and active subscriber numbers are insufficient. Vision 2020 emphasizes gender equality in ICT development, but a significant gender and digital divide persists. Exclusion issues stem from poverty, high service costs unaffordable to people

[22] Ministry of ICT & Innovation (https://www.minict.gov.rw)
[23] Rwanda Information Society Authority (https://www.risa.gov.rw)
[24] Rwanda Utilities Regulatory Agency(https://rura.rw/index.php?id=23)
[25] National Council for Science and Technology(https://www.ncst.gov.rw)
[26] African Institute of Mathematical Sciences Rwanda
[27] Japan International Cooperation Agency(https://www.jica.go.jp/english)
[28] Korea International Cooperation Agency(https://www.koica.go.kr/sites/koica_en/index.do)
[29] Deutsche Gesellschaft für Internationale Zusammenarbeit(https://www.giz.de/en/html/)

experiencing poverty, and an enduring urban-rural digital divide, complicating large-scale returns on investment.

Furthermore, Rwanda's ICT startup ecosystem struggles to produce unicorns due to the limited market size. The highest amount attracted by the startup ecosystem is $126 million, far short of the $1 billion valuation needed for unicorn status, a difficult feat given Rwanda's market size.

Figure 16: ICT ecosystem stakeholders



Source : *ICT project Rwanda (Ministry of ICT 2020), World Bank and JICA (author's compilation)*

The following section presents the methodology used to analyze the collaboration between a Japanese private firm and a tech company in Rwanda. It identifies the motivation behind selecting this international collaboration as the case study for analysis and introduces the two companies involved.

4.4. Methodology

4.4.1. Data collection and analysis

In this study, we adopt an analytical approach rather than the problem-oriented method because the cases are examined to identify the process and understand its mechanisms. Namely, the analysis here aimed at answering the question, "How international collaboration between foreign small private firms and small tech firms helps tech companies in developing countries is developed?.

We have chosen the qualitative case study because it is suitable for identifying with rich insights from the case of Rexvirt and its international collaboration with Wiredin Ltd in software development (Yin, 1994).

Two categories of in-depth interviews were conducted with different stakeholders representing distinct areas. The first category of the interview was with the CEO of Rexvirt communication and the CEO of WiredIn. The second category of the interview was with international firm, tech company, startups, government officials and policy institutions (*refer to Table 4: appendix*). These interview was conducted from Janvier to February 2023. The interview were conducted face-to-face and online using a semi-structured approach to allow for open-ended responses, following the guideline published elsewhere(Sturges & Hanrahan, 2004). The duration of the interview were within an average of 45 minutes per meeting. The purpose of the interview was twofold: first, to gain multiple perspectives and to analyze the interaction between the two companies to observe

the impact on the innovation capability of the tech firm in the developing country. The interviews were recorded with permission and transcribed. We began by asking about international collaboration between private foreign firms and small local companies. The interviews were conducted using a semi-structured approach to allow for open-ended responses. The questions were deliberately open and included the following: How do you find the international collaboration between foreign firms and local tech company strategy? Do you think international collaboration helps the local firm develop their innovation capability? How has this innovation development been done? Moreover, does the institutional environment helps small companies develop their innovation capability?

Secondary data such as government policy documents, web reports, articles and industry-focused news articles from both local and foreign newspapers were used to triangulate information obtained from interviews. The purpose was obtaining the outlook of the existing policy contributes to the development of the innovation capability of local tech firms. These articles examined specifically toselected cases of alliances, offering a broader context and supplementary insights for the research.

Additionally, the data collection was related to the applicable fragment to obtain assistance from the theoretical direction to understand people's perceptions regarding the recorded data or notes. To ensure balanced information, we use triangulation by conducting interviews from various sources with a cross-validation method (Miles & Gilbert, 2005) by identifying the following keywords:

a) Impact of international collaboration on innovation capability is related to human resources requires to absorb new knowledge to develop new products and that affects a firm's strategy

or decision-making (learning capability,) (Yam et al. 2011; Patterson & Ambrosini 2015; Santoro, Bresciani, and Papa 2020).

b) Institutional environment role means the policies that contribute to building the capability of small-scale firm and human resource (Amsden, 2001; Etzkowitz & Dzisah, 2008).

Following the procedures recommended in previous interpretive studies(Nowell et al., 2017), we analyzed the data the following phases:

1. To better understand the overall experience, we carefully review each transcript.
2. We dialogued with the data by assessing the extent to which there was a discrepancy between our preliminary description of international collaboration and whether it influences the development of the innovation capability of local firms and the way international collaboration was experienced at the observed firms and how this new mode of collaboration is developed.
3. We used NVivo 14 to conduct qualitative coding, which helped us analyze the transcript and break it into excerpts. This allowed us to identify patterns and categorize the data.
4. The entire data analysis process was streamlined and enhanced by utilizing the specialized data analysis software, specifically "NVivo" (version 14).
5. We formulated our final interpretation of the criteria for international influence firm capability development and how institutional environment contributes to the development of small tech companies in developing countries, and then compared the findings with the previous studies. This approach allowed us to assess the extent to which much our interpretation provided a new alternative view of theoretical insights.

4.4.2. Case study

The literature discussed previously talks about large scale company, such as MNC firms dealing with firms and subsidiaries in developing countries, and the fact that the flow of knowledge is one-directional. However, the case study selected involves a small-scale Tech company in Rwanda engaging in a partnership with a foreign firm to create knowledge and enhance its innovation capability. In the following, we will begin by presenting the general case of small-scale partnerships in Rwanda, including startups and incubators partnering with different foreign partners from developed countries. We found some differences in collaboration and knowledge transfer compared to what has been discussed in the literature. To understand this unique collaboration, we have chosen to examine the partnership between Rexvirt Communication and WiredIn to understand how the information is exchanged between these two parties.

REXVIRT [30] Communications Inc , is a company founded in 2009 by Hidekazu Tanaka. It operates in the telecommunications industry , employing 11¬–20 people and generating $1¬–5M in revenue. Between 2011 and 2012, Rexvirt Communication started discussing an individual alliance with WiredIn.

WiredIn Ltd[31] is an IT company based in Rwanda founded by Alain Kajangwe, specializes in offshore software development services. WiredIn offers software services in Web and Smartphone application development (iOS and Android platforms).

[30] https://www.rexvirt.com

[31] https://www.wiredin.rw

a) Case study: Rexvirt Communication and WiredIn Ltd

The ICT outsourcing partnership between REXVIRT Communication and WiredIn Ltd represents a unique case in Sub-Saharan Africa (SSA): most studies on ICT outsourcing have traditionally focused on emerging markets in Asia, Latin America, and the Middle East, with limited attention to those in Africa (LTS group, 2023). Companies from developed countries typically prioritize emerging regions for software outsourcing due to their availability of critical infrastructure, particularly electricity, internet, and skilled human resources. This case is particularly noteworthy, as no other country in Sub-Saharan Africa shares Rwanda's unique combination of geographic location, size, and limited natural resources while possessing the critical infrastructure and skilled human resources necessary to initiate such collaborations. Additionally, research on international collaboration in SSA largely concentrates on large-scale firms in mining, construction, and manufacturing rather than small-scale IT sector enterprises in areas such as software development. Moreover, no studies to date have explored collaboration between small-scale Japanese ICT firms and small-scale tech firms in Sub-Saharan Africa, particularly in the context of innovative knowledge creation. This case is an example of the successful expansion of the IT outsourcing industry in Rwanda: it has led to the creation of new business opportunities, including the establishment of an African business department; the formation of partnerships with ABC partners, Egate and Africa accounting advisory; and the creation of WiredIn Academy, which specializes in training next generation software engineers. This case study elucidates the current division of labor between REXVIRT and WiredIn Ltd work, through which WiredIn in Rwanda undertakes the majority of substantial existing software development content work, with REXVIRT acting only as the quality assurance evaluator in the process. The end product of this collaboration is then sold primarily in the markets of developed countries (USA, Germany, Netherlands, and France) and

Rwanda. This partnership has successfully completed over 30 software development projects and sold the products of those projects in Japan, France, Europe, the USA, and Africa.

b) Timeline of parthership between Rexvirt communication and WiredIn Ltd

In 2014, after establishing a permanent partnership in software development and quality control with WiredIn *(Figure 17),* Rexvirt opened a new department called Japan-Rwanda Community, responsible for the creation of business opportunities between Japan and Rwanda and for supporting Japanese companies seeking to expand their business in Rwanda and Africa. In 2018, Rexvirt signed partnerships with three Japanese companies, ABC partners[32], E-gates[33] and Africa accounting advisory[34] to provide services to foreign companies looking to expand in Africa. In 2022, WiredIn and Rexvirt opened the WiredIn academy, which aimed to train for future engineers in programming.

[32] http://abc-partners.jp/aboutus.html
A.B.C. Partners Corporation is a management consulting company in Minato Ward. They offer consulting in strategy, operations, and IT, as well as support for new business launches
[33] https://egates-africa.com
E-gates Ltd. is a Japanese consulting company based in Rwanda, specialized in market research, fundraising, and local arrangement services for Japanese companies expanding into Rwanda.
[34] https://a-advisory.com
Africa Accounting Advisory is a Japanese CPA firm based in Rwanda, offering tax, accounting, and advisory services in Rwanda and Kenya, including internal control construction and DD.

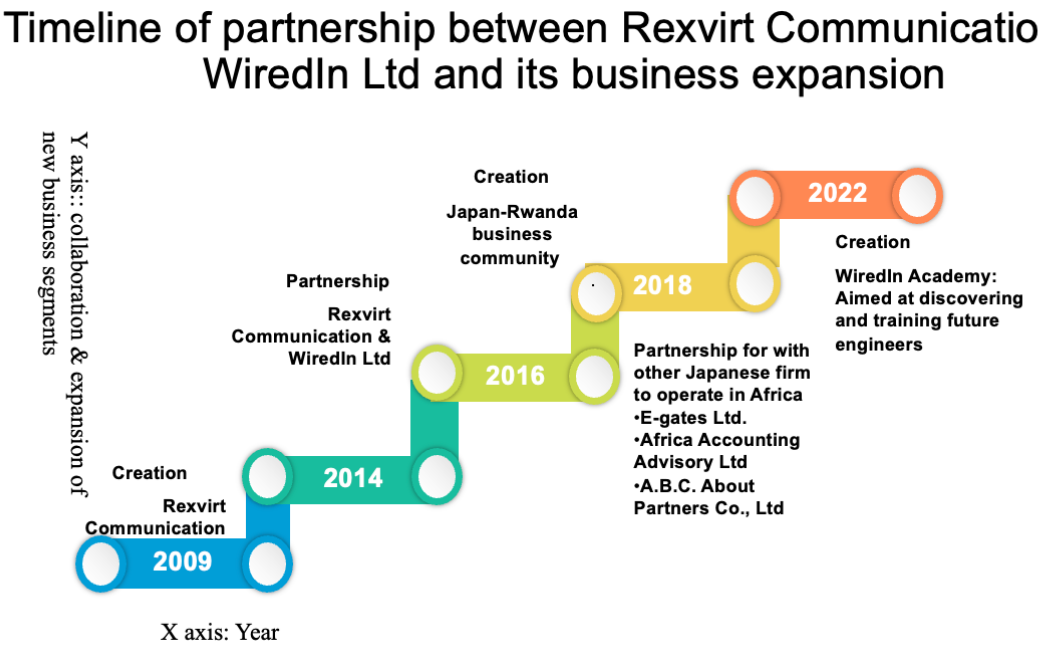


Figure 17: Timeline of development of partnership between Rexvirt and WiredIn

Source: Author's compilation based on Rexvirt website

c) Iterative learning process through business collaboration (Rexvirt and WiredIn)

The partnership between Rexvirt Communication and WiredIn Ltd involves the creation of software which is primarily sold in developed countries as well as in some developing countries in Africa. The partnership between Rexvirt Communication and WiredIn Ltd involves the creation of software which is primarily sold in developed countries as well as in some developing countries in Africa. It is essential to gain an understanding of this software development process: it involves frequent and intensive collaboration between Rexvirt and WiredIn, which leads to knowledge creation and transfer (McDermott & Corredoira, 2010). Hence a detailed analysis of this process is necessary for an understanding of how the final product is created, and of how WiredIn in Rwanda builds its innovation capability.

The overall process is summarized in Table 12, which combines the timeline of the iterative learning process within the business collaboration between Rexvirt and WiredIn (Figure 18) and the collaboration process between the two companies (Figure 19). All these processes are combined divided as follows: In the first phase, Rexvirt negotiates a contract with a client in a developed country (phase 1 in Figure 19). Upon successfully signing the contract, Rexvirt shares the project's terms of reference with WiredIn, initiating phase 2 (see Figure 19).

Table 12: Summary of the phases outlined in the timeline from Figure 18 and the activities conducted during the collaboration process between Rexvirt and WiredIn, as illustrated in Figure 19

Phase numbers Figure 18	Activity	Number in Figure 19
Phase 1	Negotiation and signing of the contract of the project with the client by Rexvirt	1
Phase 2	Rexvirt shares the terms of reference of the project with WiredIn	2
Phase 3	Formation of a team to develop the software	3
Phase 4	Development of the software	4
Phase 5	Testing of the software	5
Phase 6	Transmission of the software to Rexvirt for QA	6
Phase 7	QA Verification of the software to confirm that if it matches the customer needs	7
Phase 8	Delivery of software to the customer (If there is no fault)	8
Phase 9	(If there is a fault): Transmission of the faulty software to the WiredIn development team to fix the fault	9

Source: Author's compilation

In the third phase, WiredIn assembles a team of engineers to develop the software, followed by testing in phase 5, both of which are represented by numbers 5 and 6 in Figure 19. The software is then sent to Rexvirt for quality control in phase 6. In phase seven, Rexvirt receives the product; if the software is free of defects and meets the client's requirements, Rexvirt delivers the final product to the client, ensuring satisfaction and fulfillment of contractual obligations in phase 8. These steps

correspond to numbers 7 and 8 in Figure 19. However, if a defect is identified, Rexvirt returns the software to WiredIn along with a detailed report outlining the issues that need to be addressed, as depicted in phase 9 and illustrated by number 9 in Figure 19. Once the fixed product is returned by WiredIn, it undergoes quality control checks at Rexvrt until it meets both quality standards and customer requirements. This process of fixing the defect in the software creates a learning cycle for WiredIn as they learn from the Rexvirt's experience. This iterative learning process is shown in Figure 19, specifically in numbers 5, 6, 7, and 9, which illustrate the collaboration process between Rexvirt and WiredIn.

Beyond the collaboration between the two companies to create software, as illustrated in Figure 19, various government agencies play a significant role in influencing this partnership by providing a conducive environment through policy implementation and regulation. For instance, the Rwanda Utilities Regulatory Authority (RURA) regulates and licenses software development companies; the Rwanda Development Board (RDB) facilitates connections between local and international firms; the Ministry of ICT and Innovation (MINICT) oversees sectoral policies; and the Rwanda Information Society Authority (RISA) is responsible for digitizing the country. Additionally, international organizations like JICA support this collaboration by providing human resources development and other forms of assistance.

Timeline of the iterative learning process within business collaboration (Rexvirt and WiredIn)

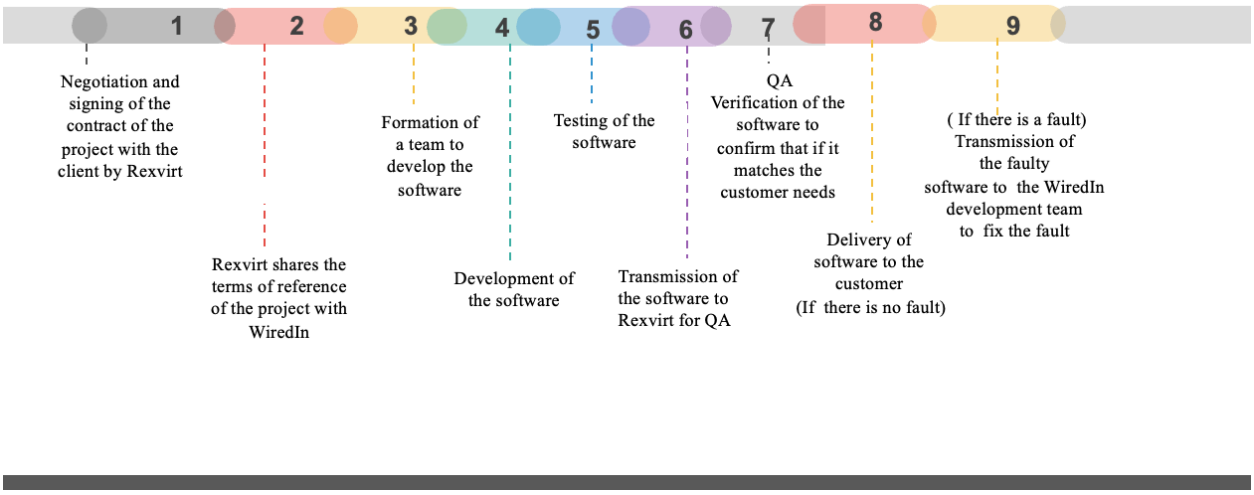
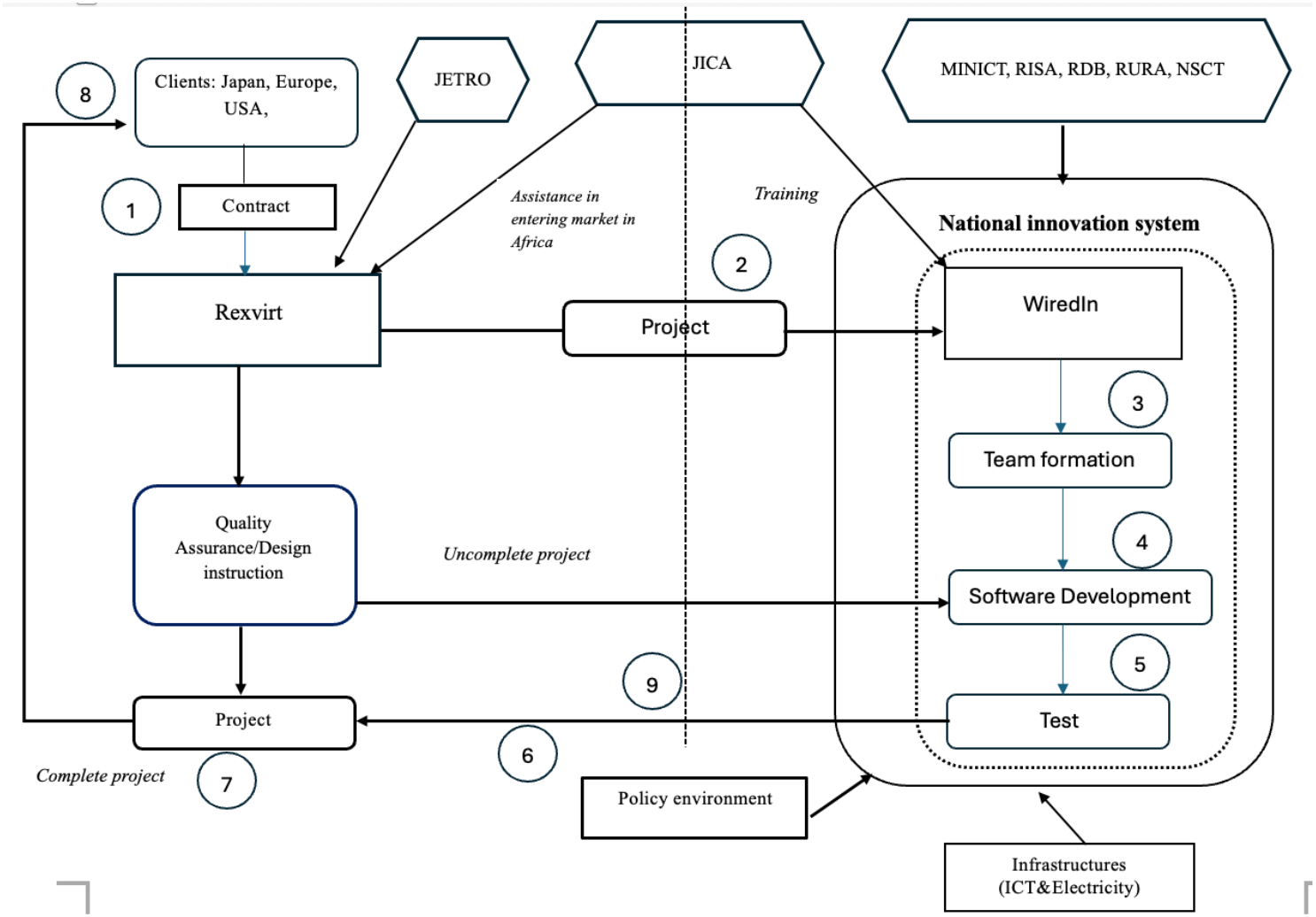


Figure 18: Timeline of the iterative learning process within business collaboration (Rexvirt and WiredIn)

Source: Author's illustration based on Rexvirt Website

Figure 19: Process of collaboration between Rexvirt and WiredIn



Source: Author's compilation from Rexvirt website

4.4.3. Research approach

I chose for study Japanese private firms' partnership with tech companies in Sub-Saharan Africa as a case of inter-firm international collaboration. This choice is driven by Japanese companies' increasing interest in Rwanda and the support provided by JICA in the ICT sector. Japan contrasts with other countries, such as China, which invest heavily in manufacturing, construction, and mining rather than ICT. This Japanese interest to Rwanda include the dispatch of ICT advisors in incubators such as Fablab and Klab, which have paved the way for initiatives such as "ICT Innovation Ecosystem Strengthening Project" for construction of an ICT innovation ecosystem and contribution to the realization of the "Smart Rwanda Master Plan." According to one blog post, the number of Japanese companies involved has increased from 4 to 30 since 2014 *(refer to Table[35] 12)*. Additionally, a 2022 TICAD Survey revealed that 54.5% of Japanese firms plan to expand their sales activities in Africa. For instance, RDB reported that Japanese investments in Rwanda total USD 21.458 million, with a significant focus on the ICT sector, while Chinesecompanies investment in Rwanda accounts for USD 250 million, with a focus on light manufacturing, agro-processing, construction, and mining.

Table 13: Trend of Japanese vs Chinese company involvement in Rwanda (2014 - 2019)

	2014	2019
Number of Japanese companies	4	30
Number of Chinese companies	-	50

Source: Author's compilation

[35] Table 12 illustrates the evolution in the number of Japanese and Chinese companies operating in Rwanda between 2014 and 2019. This information is sourced from the 'Japan in Rwanda' website and the Rwanda Development Board. https://www.rwandainjapan.gov.rw/info/info-details/featured-how-rwanda-and-japan-have-deepened-diplomatic
relations#:~:text=The%20Rwandan%20Government%20is%20also,4%20to%2030%20since%202014.
https://rdb.rw/zhejiang-governor-attends-china-rwanda-business-forum-with-57-person-delegation/
https://rdb.rw/rwanda-development-board-welcomes-high-level-japanese-business-delegation-to-rwanda/#:~:text="We%20would%20like%20to%20increase,investment%20between%20the%20two%20countries".https://rdb.rw/zhejiang-governor-attends-china-rwanda-business-forum-with-57-person-delegation/

4.5. Findings

The findings of this study can be classified according to type of actor: (i) actors in the developing country, and (ii) actors in the developed country. This categorization is designed to facilitate response to the main question: How does the new mode of international collaboration develop between small-scale tech firms from developed and developing countries?

This can be broken down into four sub-questions:

- What was the impetus for initiating the collaboration?
- What are the effects of this new mode on small-scale firms in developed and developing countries?
- Was some supporting policy system designed intentionally to enable the hosting of this kind of collaboration?
- What role (s) did the international organizations play some role in this new model of collaboration?

Each of the four sub-questions is addressed in the following sections.

4.5.1. New mode of international collaboration between small-scale tech firms from developed and developing countries

a) Actors in developing country

The collaboration was developed in two levels. First, the Rwandan government, through the Rwanda Development Board, organized a matching event supported by international organizations such as the Japan International Cooperation Agency (JICA), Gesellschaft für

Internationale Zusammenarbeit (GIZ), Expertise France, and the Strategic Environmental Archaeology Database (SEAD) in Rwanda. Second, the collaboration is initiated in Japan by agencies such as JICA and JETRO, which provide a platform aimed at connecting potential Japanese small-scale companies with tech-focused small-scale companies in Rwanda. With the help of JICA, the RDB disseminated information about the participating Japanese companies to the tech-small companies in Rwanda to help them prepare. Then, during the matching event, firms with similar business goals could explore opportunities for future partnerships.

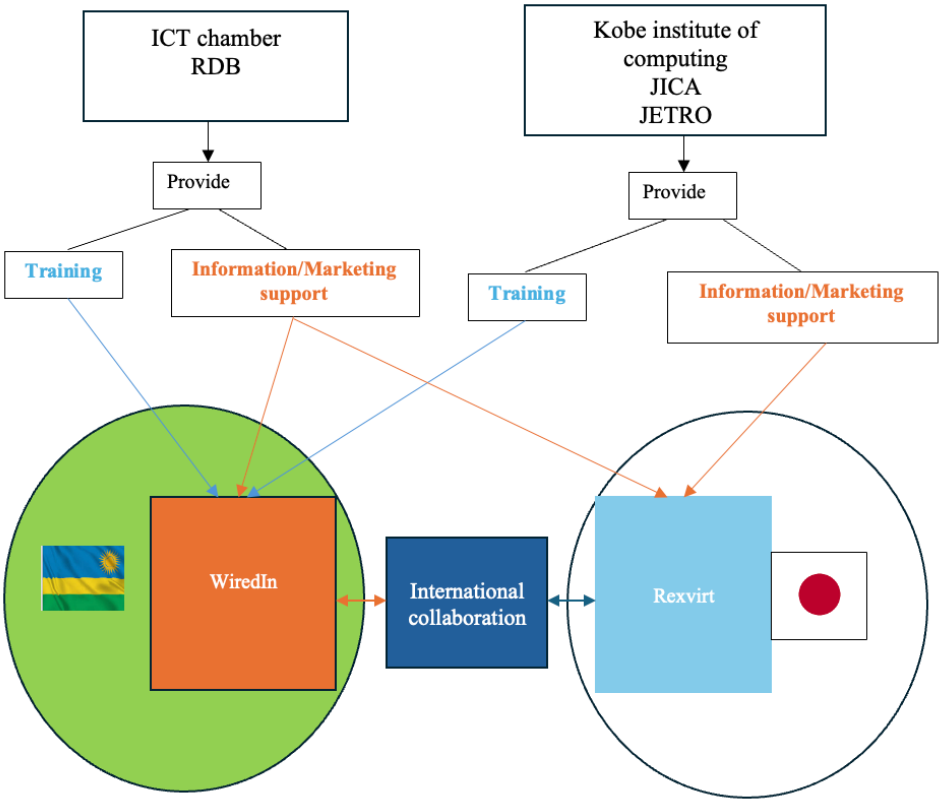
b) Actors in developed countries

Analysis of the secondary data and interview records reveals that this new mode of collaboration between tech small-scale firms from developed and developing nations is usually developed through matching events. For instance, in the case of Rexvirt Communication, based in Japan, JETRO, JICA, and the Kobe Institute of Computing played a significant role in facilitating the development of this new mode of collaboration between small-scale Japanese hi-tech firms and small African high-tech firms (refer to Figure 20). For instance, JETRO helps developing countries organize exhibitions in Japan to showcase their products, technologies, and investment opportunities (JETRO, 2013). JETRO has also established a consultation service for inclusive business, which connects Japanese companies to potential business partners in Africa and Rwanda, conducts tailored surveys, and facilitates test marketing initiatives. In the case of the Rwandan market, JETRO and JICA, who supported Rexvirt by providing information and marketing support

regarding the Rwandan ICT market, were instrumental in the establishment of the partnership with WiredIn.

Additionally, local public agencies, such as the ICT chamber and RDB, provided Rexvirt with significant information about the Rwandan market. In 2018, JETRO organized a business mission to Rwanda and Tanzania, with the help of Rexvirt Communications, to connect Japanese firms with African counterparts. Now, Rexvirt acts as a gateway, connecting Japanese companies to Rwandan firms. Reflecting on the role of JETRO in the development of this partnership, the CEO of Rexvirt observed that:

"In my experience, the Japan External Trade Organization (JETRO) assists Japanese companies in developing and importing products from Africa. Through the program, previously called the African Business Demonstration Project, JETRO eagerly supported my trip to Rwanda, given the innovative nature of my project."



Figure[36] 20: Development of business between Wiredin and Rexvirt

Source: Author's compilation

4.5.2 . The impetus for initiating the collaboration.

a) Actors in the developing country

In the interviews small tech firms in developing countries reported that they engage in international collaborations with small private foreign firms for a number of compelling reasons. These reasons can be classified usefully as follows:

[36] Figure 18 illustrates the actors that played roles in the development of the collaboration between WiredIn and Rexvirt.

Access to funding: The majority of respondents observed that tech firms in developing countries often face challenges in securing the funds necessary for their ventures. International partnerships are instrumental for overcoming this hurdle.

- " *It is challenging for small tech companies to develop innovative products if the companies do not have the necessary resources. So, our motivation was identifying companies who can help us to achieve our goals."*

Access to markets: A number of interviewees reported that their primary motivation for seeking these partnerships is scaling and achieving ambitious market access goals.

- "*Our motivation was mostly about scaling and achieving the bigger goals. You cannot do things alone. You need different organizations that are in line with what you do."*

Human resource development: The majority of the respondents identified the imperative of human resource development as a significant driver for partnerships. International collaborations facilitate the transfer of knowledge and skills, contributing to the professional growth and development of the small tech firm's team.

- *"Most of our international collaboration with foreign firms is related to capability building, in terms of human resources, through specialized training offered by our partners."* said one respondent.

Product co-creation: A number of interviewees emphasized the need for co-creation to ensure that projects align with client expectations. The involvement of foreign partners, who invariably bring advanced technologies and innovative ideas to the table, greatly enhances the capabilities and competitiveness of small tech firms.

- *"We seek co-creation to guarantee that our projects meet and even exceed client expectations."*

b) Actors in the developed country

Secondly, our findings underscore the mutual benefits derived from international collaboration between private foreign firms and small tech firms. However, for Rexvirt the impetus of this collaboration was the search for means of lowering production costs and gaining access to skilled IT workers at lower prices than those in Asian countries. "*This collaboration helps us to have access to best engineers trained by Carnegie Mellon University established Rwanda with a lower cost than Asian countries*".

We were also seeking a collaboration where the time difference would be suitable for software development and increase our productivity.

" The 7-hour time difference allows for increased productivity, as overlapping time can be utilized for various communication and coordination tasks, while the non-overlapping time periods can be dedicated to focused work progress."

4.5.3. Effect of the new form of collaboration on the collaborating small-scale firms

The interviews revealed that this new collaboration had some positive impact on the innovation capability of the scale firms, for actors in both developing countries, and developed countries.

a) Developing country actors

Most participants acknowledged the positive impact, through knowledge sharing, of international interfirm collaboration on the innovation capabilities of small tech companies.

The consensus among respondents is that foreign partners often bring advanced technologies and innovative ideas to the table, which bolster the capabilities and competitiveness of local small tech firms. Many emphasized that "*knowledge sharing is very important; you cannot be successful alone. You need to have this kind of synergy to actually fill some of the gaps you have."*

The results also revealed that international collaboration has a substantial positive influence, through training and skill development, on the innovation capacity of local small firms. A number of participants made observations such as

"A significant portion of our collaboration involved training; for instance, one notable program involved the engagement of international experts, forming the basis of our partnership," and

"Our international collaboration with foreign firms is related to capability building in terms of human resources through specialized training offered by our partners, these collaborations help our team build their technical skills."

Participants rated the effectiveness of international collaboration on local firm activities on a scale of 0 to 10. The average score[37] across all four companies in our baseline study was 8.25 *(Table 13).*

Table 14: Perception of companies regarding the impact of international cooperation

Company name	Rating (0 to 10)
Company 1	10
Company 2	7
Company 3	7
Company 4	9
Average	8.25

Source: Author's own table, based on the interviewee's responses.

- *WiredIn Ltd*

The findings from the interviews and *Figure 26 (Iterative learning process through business collaboration)* suggest that the partnership between Rexvirt Communication and WiredIn Ltd has upgraded Wiredin's software development capability and marketing capability, through learning from fixing faults in software and also through adoption of some marketing strategy for use in the work to expand the project in Rwanda and other African countries. More concretely, through this iterative learning process centered on remedying software flaws, WiredIn was able to develop its innovation capability through catchup process by

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Score[37]:

- Zero is the lowest rating; international collaboration does not improve a firm's innovation capacity.
- A score of less than five means that the developing nation firm does not experience any impact of international cooperation on its innovation capability.
- A score of more than five means that international cooperation has had some positive impact on innovation capability.

learning from the experience of Rexvirt. Also, this collaboration also enabled WiredIn to expand its engineering team and integrate international talent from Japan into their software development projects. A number of responses harmonized with responses such as *"We closely collaborate with the Japanese company, with our local engineers leading software development. Our collaboration includes seamless coordination with the international team to ensure that projects meet client expectations."* For example, after entering into collaboration with Rexvirt Communication, WiredIn increased its pool of engineers from 10 to 19 between 2014 and 2020(JICA Rwanda Office, 2016) (*refer to Table 14).*

Table 15: Number of engineers employed by WiredIn (2014-2020)

	2014	*2020*
Number of WiredIn engineers in Rwanda	*8*	*15*
Number of engineers WiredIn engineers in Japan	*2*	*4*

Sources: JICA Reports 2015 and outsourcing destination guide (Author's compilation)

Source : Author's compilation

b) Developing country actors

- *Rexvirt Communication*

The findings regarding the impact of interfirm collaboration indicate that partnering with WiredIn enabled Rexvirt Communication to access IT-skilled human resources and diversify its business endeavors by establishing a new department dedicated to business development. This partnership has allowed Rexvirt to combine its soft skills with those of WiredIn to produce high-quality products that meet client expectations in Japan and other developed

markets. There were numerous comments along the line of, *"Our collaboration with WiredIn was made possible by the presence of skilled human resources and essential infrastructure, such as reliable internet and electricity in Rwanda. Partnering with WiredIn provided us access to skilled engineers to achieve our business goals. As a result, our operations have expanded to include business activities in both the African and Japanese markets. Today, our partnership actively supports Japanese companies looking to explore opportunities in the African market."*

4.5.4. Supporting policy system with the specific aim of hosting collaboration between ICT small-scale firms from developed and developed countries

In the interviews, 8 out of 11 participants stated that Rwanda's policy framework was developed specifically to effectively prepare small local tech firms for international collaboration with foreign entities. The participants attributed that effect primarily to Vision 2020 which gave the direction of the economy from agrarian to knowledge based economy by emphasizing on the importance of knowledge acquisition through specialized training in science, technology, engineering, and mathematics (STEM) and innovation culture related to ICT technology. These specialized programs and training initiatives were aimed at enhancing the skills and competencies of individuals within local small enterprises. For instance, incubation centers, universities, research facilities, and specialized competition programs contribute in valuable ways to this preparatory process through their efforts to bolster human resources capabilities. Most respondents emphasized that, as one participant said, *"The government policy such as Vision 2020 and STI policy actively supports the*

capacity development of small tech companies and individuals working within startup or small-scale enterprises."

Furthermore, most of the interview respondents observed that the Rwandan government has been instrumental in enabling funding for innovation and entrepreneurship, in statements along the line of *"The government leverages various mechanisms, including competitions such as the 'Business Development Fund Innovation' competition, where promising projects are selected and subsequently funded through incubation." For instance, RDB Innovation Funds play a crucial role in fostering innovation within small companies."*

The analysis here of Rwanda's policies confirms that the government has intentionally implemented a policy agenda to promote this new type of cooperation (*Figure 21*). Indeed, the government began in 2000 by implementing Vision 2020, aimed at transforming the economy into an ICT-based economy to facilitate small-scale international cooperation. The government adopted three major policies to achieve this: the National Information Communication Infrastructure from 2000 to 2015, aiming to build ICT infrastructure and make Rwanda an ICT hub; the Science, Technology, and Innovation Policy to develop human capabilities in ICT, foster innovation, and support the private sector; and then SME policy to promote the creation of SMEs and foster entrepreneurship in the ICT sector.

The government established the Rwanda Development Board in 2009 to promote partnership by matching ICT companies from Rwanda with international firms to promote this new mode of partnership. The government also implemented an investment code policy to incentivize foreign firms interested in partnering with Rwandan companies. In 2020, the government

launched its Entrepreneurship Development policy to promote entrepreneurship and the growth of SMEs and startups.

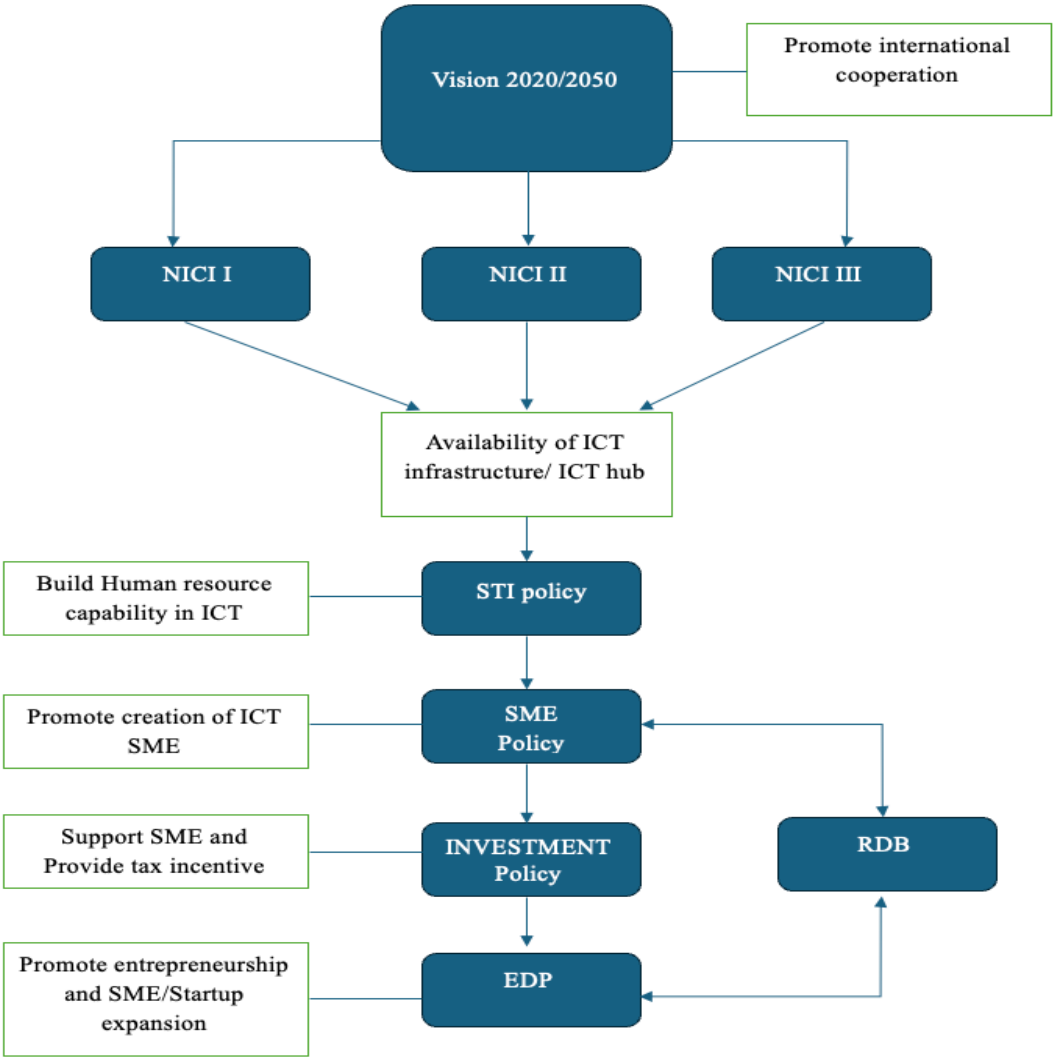

Figure 21: Policies that contribute to growth of small-scale firms

Source: Author's compilation

4.5.5. The role of international organizations such as JICA in this new model of collaboration

a) Developing country actors

Participants have observed that JICA's role in this new mode of collaboration involves supporting the Rwandan government in developing its ICT program to achieve the goals of Vision 2020. This JICA role includes supporting the government's program of human resource capability development by providing specialized training to tech startups, incubators, individuals to work in SMEs, and students in Rwanda and Japan. For instance, JICA helped the government formulate and implement the National Information Communications Infrastructure Plan, which is essential for the operation of small-scale firms in Rwanda. JICA also contributed to the creation and strengthening of the ICT Chamber and incubators such as K-lab and Fab-lab, which play a crucial role in providing training for small-scale Rwandan firms, preparing them for partnerships with international firms (JICA, 2022). One participant said that:

"The Japanese bilateral cooperation has been highly beneficial, particularly in skill development and business growth. Japan has provided scholarships through initiatives like the ABE initiative[38], with many engineers benefiting from these programs, including two-year studies and internships in Japan."

[38] The ABE Initiative (African Business Education Initiative for Youth) is a JICA program that provides African youths with the opportunity to pursue master's degrees at Japanese universities as international students and participate in internships at Japanese companies.

Furthermore, JICA supports the Rwanda Development Board in organizing events to match potential Japanese firms with potential Rwandan firms for collaboration and to provide funds to small companies with innovative projects. Additionally, JICA facilitates and organizes exhibition tours, such as the pitching trip to Tokyo, for companies in Japan to help small-scale firms pitch their ideas.

"Organizations like JICA have played crucial roles in establishing a solid foundation for these collaborations, contributing significantly at the onset. For instance, JICA funded a project that supported over 50 successful startups, demonstrating the fruitful nature of the cooperation at the national level."

b) Developed country actors

JICA's role in this new collaboration for Japanese firms involves encouraging private companies to invest in Africa. In recent years, JICA has increased its support for Japanese private companies investing and operating in Africa. This includes providing financial assistance at different stages of project implementation, such as helping these companies conduct information gathering and feasibility studies through JICA's Proposal-Based Programs with the Private Sector. Furthermore, JICA's Private-Sector Partnership Volunteer Program sends employees of Japanese private companies to Africa, enabling them to learn local business practices, assess market conditions, and gain valuable global experience (JICA, 2016). Another role of JICA in this new mode of collaboration consists of providing information about opportunities in Africa and advising the companies. For instance, JICA organizes seminars in locations where Japanese companies interested in investing in Rwanda

are invited, and Japanese companies such as Rexvirt, which are already doing business there, are invited to share their their experiences of operating in Africa (JICA, 2018).

4.5.6. How this new mode cooperation differs from the traditional one

Studies on international cooperation argue that firms cooperate with foreign partners to tap into an ever more globally dispersed knowledge frontier, and to reduce R&D costs (Harhoff et al. 2014). Most developing countries are engaged in different types of cooperation for economic growth. For instance, governments in developing countries have bilateral cooperation, where they have a partnership with other countries or entities that entails specific objectives and interests (Maria-Irina & Anca-Georgiana, 2018) or multilateral cooperation, where the government is engaged with multiple nations or entities to address some shared challenges or to increase the exchange of goods (Mohammed Saaida, 2023). In addition to the above, international cooperation involves companies or individuals working together on common objectives or strategies, particularly in research or the establishment of industrial standards (Faria & Schmidt, 2012). The last type of international cooperation mentioned above is considered traditional in this study. Studies on traditional international cooperation in developing countries mostly focus on MNEs rather than small-scale companies. In Africa, most firms' traditional cooperation is led by multinational enterprises focused on specific project-based transactions and deals, primarily in mining, infrastructure, and construction (OIT, 2015). The approach to this cooperation is characterized by the sharing of resources such as technology, capital, or expertise, often driven by risk mitigation and cost-sharing considerations (Adamik, 2008). In traditional cooperation, knowledge is driven into developing countries by multinational enterprises, with the government creating

a conducive environment for the MNE (Arocena & Sutz, 2000; Watkins et al., 2015), and that learning occurs when the firm belongs to a GVC (Pietrobelli & Rabellotti, 2011).

Unlike traditional cooperation, the new mode of cooperation involves small-scale companies and international actors (private foreign firms) operating in the area of ICT. Despite their limited resources compared to MNEs and their incapacity of persuading government policy in they favor like MNC (Mthombeni, 2006), these companies bring key assets to the partnership, including knowledge, organizational skills, and advanced technology. In this new mode of cooperation, success is based on human capital, with each company focusing on its potential in its area of specialization. Learning occurs through interaction when the two companies work on a project, fostering a flexible and innovative environment that can evolve dynamically, based on project needs and emerging opportunities; demonstrating the uniqueness of of this new mode of collaboration. Moreover, in this new partnership mode, there is a bidirectional flow of knowledge between the two small-scale companies, contrary to the traditional mode of cooperation, where knowledge primarily flows from developed to developing countries.

Overall, this new mode of cooperation is unique and different from the traditional mode in four aspects: (i) the actors involved in the cooperation (small-scale firm with limited resources); (ii) the sector of activity (ICT); (iii) the direction of knowledge flow (bidirectional); and (iv) learning through interaction.

Chapter 5: Discussion and Conclusion

This final chapter is organized into four sections. The first section discusses the findings and conclusions from Chapters 3 and 4. The second section summarizes the overall conclusions of the thesis, addressing the research questions posed. The third section explores the potential policy implications of these findings for other developing countries in Sub-Saharan Africa, similar to Rwanda, that are looking to develop their startup ecosystems and attract private investment. Finally, the fourth section suggests directions for future research.

5.1.1. Discussion chapter 3

Rwanda, a small, landlocked country in East Africa, lacks significant natural resources and has a small domestic market. Despite its GDP growth in the past decade, Rwanda remains heavily reliant on overseas development assistance. To transform its economy into a knowledge-based, middle-income economy, the Rwandan government has adopted a conducive legal framework, and a suite of policies aimed at creating the right conditions for investment and the development of ICT products. The analysis of Rwanda's policies shows that this policy vision was first established in 2000 with the adoption of Vision 2020, which aimed to shift the economy from an agriculture-based to an ICT-oriented model. This initial policy set the vision and direction for the new economy. To achieve the goal of an ICT-based economy, the government then adopted supportive ICT policies focused on building infrastructure, developing human resources in ICT, and fostering digital knowledge essential for ICT development. These supportive policies include the National Information Communication I, II, and III, which aimed to enable the ICT environment, transform Rwanda

into an ICT hub in Africa, develop ICT infrastructure, and provide digital services. Additionally, the government implemented the Science, Technology, and Innovation Policy, which focused on knowledge creation, fostering partnerships, supporting SMEs and startups, and advancing Rwanda's science and technology capacity. Other key policies include the Small and Medium Enterprise Policy in 2005, and the Entrepreneur Development Policy in 2020, which aimed to empower startups by creating an enabling environment that nurtures dynamism and innovation. Implemented through a gradual process, these policies have collectively created a conducive environment for foreign investment in the ICT sector.

This aligns with the innovation policy goals proposed by Pierson, (2004) who argues that countries that seek economic development should determine precisely which policy mechanisms (a) lead to the development of economic growth or determine which direction aligns with desired goals, and (b) create markets that increase business expectations for future growth opportunities that can drive private investment (Kattel & Mazzucato, 2018).

Moreover, a conducive legal framework environment is also essential for facilitating the integration into the market of private foreign firms. Most participants mentioned political will, security, and the tax and incentive policy that make it easy for private foreign firms to integrate into the local market. For example, in 2015, Rwanda adopted an investment code, and in 2020, the government updated that policy. This policy aims to attract more foreign direct investments and provide investors with tax breaks and other incentives. In terms of policy similarity, this strategy of using policies to attract foreign investment and knowledge has proven successful in other nations, such as Singapore, which established its Startup Tax Exemption (SUTE) scheme in 2005 to aid new businesses and entrepreneurs, and Chile,

whose Startup Chile (SUP) program, launched in 2010, provides incentives for up-and-coming entrepreneurs from around the globe to launch their business ventures in Chile. This policy strategy aligns with observations by some scholars that institutional factors (e.g., intellectual property rights, taxation, labor market legislation, and removal of financial and legal obstacles to business creation) could shape economic activity across economic sectors (Coad, 2014; Davidsson & Henrekson, 2002).

However, different stakeholders have described a different aspect of the startup ecosystem in attracting foreign investment; for this minority of interviewees, the conducive legal framework aspect is one point but for them national policies can only trigger inter-firm international cooperation if the startup ecosystem is mature, i.e., if some critical resources (human resource capability or infrastructure) are available, and if the market is attractive. This statement aligns with Cukier and Kon (2018), who stated that a startup ecosystem is considered mature when it has hundreds of startups with significant investments and global impact. As the Swiss Contact (CSSC) initiative reported in 2019, Rwanda had 403 startups and received approximately 126 million US dollars in investments.

Furthermore, the Rwandan government has adopted several key policies regarding learning and capability building. These include Vision 2020, adopted in 2000; Vision 2050, adopted in 2020; and the Science, Technology, and Innovation (STI) policy, adopted in 2005. These policies emphasize the importance of developing a pool of human resources in the ICT sector. The Rwandan government's adoption of these policies demonstrates its strong commitment to developing human resources and infrastructure and fostering innovation through technical and vocational education and training (TVET). The findings from interviews and analysis of

Rwanda's existing policies align with the argument made by Mathews and Cho (2000) that government can use national policy to (a) facilitate the acquisition of human capabilities and technologies and (b) support acquisition to enable access to economic growth.

However, the above does not align with the argument of Conconi and Perroni (2009) that commitment to national policies does not necessarily catalyze fostering international cooperation. Nonetheless, it requires government engagement through some specialized public institutions that may play a vital role in implementing policies essential to attracting private foreign investment (Constantine, 2017). For instance, Rwandan government's creation of critical agencies such as the Rwanda Development Board (RDB) in 2009 , ICT Chamber in 2011, Rwanda Information Society Authority (RISA), and the National Council for Science and Technology (NCST) in 2017, may be indicators of policy commitment on the part of the government of Rwanda and may likely play a crucial role in enforcing policies and demonstrating their commitment to attracting private foreign investment. The shared vision has also been instrumental in achieving goals through collaboration with other government agencies.

Despite the variation in views, perceptions of the results of the national policy were highly similar across interviewees: all interviewees acknowledged that national policy triggered inter-firm international cooperation. This echoes the statement of (Joseph et al., 2019) that governments used national industrial policies to attract foreign direct investment by multinational companies, thinking that those firms would generate employment.

Regarding our question the flexibility, and agility as main factors attracting private tech foreign firms. Indeed, the analysis of the national policies revealed that through the STI policy (STI policy, 2006) and the proof-of-concept policy for digital innovation, Rwanda

offers foreign private firms a ground where they can "test-and-learn" and launch their innovations (Vision2050, 2020). In instance, according to interviews, the interviewees highlighted Rwanda's flexible policies and agility as factors contributing to the country's success in attracting foreign companies to test their innovative, often emerging technologies. Specifically, the Rwandan government's adaptability in providing of Zipline[39], a foreign company, with a testing ground demonstrates the openness and flexibility of the national policy. Furthermore, the interviewees found that the policy's openness, flexibility, and agility were key in drawing private foreign investment to Rwanda, especially given the rigid policies in many other African nations. This result aligns testing (Iizuka & Ikeda, 2019) who stressed that foreign tech companies are usually looking for a location for prototype testing(Iizuka & Ikeda, 2019) and reflects Featherston et al. (2016), who argue that developing countries eager to achieve economic growth should consider promoting agile and flexible policies and regulatory institutions to attract new knowledge and emerging technology to help them overcome local obstacles.

[39] Zipline is an American company that was founded by Keller Rinaudo, Keenan Wyrobek, and William Hetzler in the year 2014. The company designs drones and uses them in Africa to distribute medical products. Initially, Zipline was searching for a testing ground to operate but could not obtain authorization in the US. Finally, the government of Rwanda signed a deal with Zipline in 2016, allowing the company to build a distribution center near Muhanga. Zipline began its commercial operations in Rwanda in the same year. (https://www.technologyreview.com/2017/06/08/151339/blood-from-the-sky-ziplines-ambitious-medical-drone-deliv ery-in-africa/)

5.1.1.2. Conclusion: Chapter 3

The findings of this study demonstrate that national policies can contribute to facilitating partnerships between foreign tech firms and tech startups in developing countries. Such contributions are achieved through a gradual and consistent policy implementation process, where the government demonstrates its commitment to policy adoption and implementation and initiates periodic policy evaluations to inform the adoption of subsequent policies based on lessons learned. However, the success of these policies depends on institutional factors such as flexible and agile policies that enable the creation of new ICT markets essential for attracting foreign knowledge into startups, as seen in the case of Rwanda. Additionally, conducive legal frameworks are a critical factor that provides an investment-friendly environment, allowing foreign private companies to operate effectively in the domestic market in Africa. Furthermore, providing basic physical infrastructure such as roads, electricity, banks, and internet connectivity is essential for supporting the success of international partnerships between foreign firms and domestic startups. The capacity of adopted policies to accommodate foreign tech companies seeking a location for prototype testing in the IT sector could also shape economic activity across sectors and attract foreign knowledge to the private sector.

However, a lack of the policies or institutions that support and facilitate such partnerships between foreign private firms and startups is a significant factor of attracting private investment in developing countries. Another factor is agile policies that can adapt to changing circumstances and take advantage of new opportunities. Finally, knowledge acquisition,

human resource training, and access to funds and equipment are crucial factors that can promote successful partnerships between foreign firms and domestic startups.

5.1.2. Discussion: Chapter 4

Rwandan small tech firms need to access new markets, skilled human resources and product co-creation, so they make considerable effort to form external knowledge-creation collaborations with small tech firms from developed countries (Aschhoff & Schmidt, 2006.; Hagedoorn, 1993; Narula & Hagedoorn, 1998). Similarly, to lower production costs and gain access to IT-skilled workers at a lower price, small-scale firms from developed countries seek collaborations with small-scale firms in developing countries. This dynamic has led to the emergence of a new mode of cooperation between small-scale firms from developing and developed countries; this new mode contrasts with traditional forms of cooperation that typically involve multinational enterprises (MNEs). In this study, we observed that this new mode of international collaboration is facilitated by public institutions such as the Rwandan Development Board and the ICT Chamber, with support from international organizations such as JICA and JETRO. These collaborations are promoted through matching events organized in Rwanda and Japan, aiming to connect potential Japanese small-scale companies with tech-focused enterprises in Rwanda. However, for the matching to be successful, the two small-scale companies must have aligned business goals and a will to initiate and sustain effective partnerships.

Consistent with the findings of prior studies (Osabutey et al., 2014), we find that this form of collaboration has some effect on the small-scale firms in developing countries. The results show that small-scale companies in Rwanda are depending progressively more on collaborative plans with foreign firms from developed countries in their efforts to access or obtain knowledge, and to develop their capacities through training and knowledge sharing.

The findings of this current study provide evidence that this new mode of international collaboration is more likely to enhance the innovation capability of small tech firms via knowledge sharing between the two entities, and also that it guarantees that quality of the products developed by local firms meets international standards (Fu et al., 2022).

It was found that the partnership between Rexvirt Communication and WiredIn Ltd, had some effect on WiredIn software development capability and marketing capability. The interaction between the two small-scale companies shows that learning occurred in the course of repairing software defaults, and that WiredIn developed its innovation capability through a catch-up process by learning from Rexvirt's experience (Fan, 2006; Madsen & Smith, 2008). However, successful correction of the default in the product (after receiving a quality assurance test report from Rexvirt) depends on cognitive factors such as absorptive capacity of WiredIn engineers and the availability of skilled software engineers at WiredIn to receive, understand, and apply the knowledge to improve the faulty product (Patterson & Ambrosini 2015; Santoro, Bresciani, and Papa 2020). Additionally, in terms of motivational factors, the partnership between WiredIn Ltd and Rexvirt Communication has enabled WiredIn to increase its pool of qualified human resources from eight to 15 engineers and has facilitated the integration of four Rexvirt staff members in charge of quality assurance to strengthen WiredIn's innovation capabilities (Yamakawa et al., 2008).

Moreover, this new mode of collaboration with actors from developed countries has helped the company to access highly skilled human resources in IT at a lower cost and diversify its business endeavors by establishing a new department dedicated to business development in Africa.

These findings from the interviews align with empirical evidence suggesting that the success of international collaborations depends on innovation capability (learning intent and absorptive capacity) (Patterson & Ambrosini, 2015; Santoro et al., 2020), and the institutional environment (policies, infrastructure, tax incentives)(Coad, 2014) . These factors not only encourage such collaboration by supporting the development of local small-scale firms through training and funding, they also play an essential role in facilitating knowledge transfer, a key function in innovation systems.

The findings reveal that Rwanda's policy framework was intentionally developed to effectively prepare small local tech firms for international collaboration with foreign entities. This government strategy involved well-defined policies with specific goals and the creation of the Rwanda Development Board, aimed at connecting potential Rwandan firms with foreign partners. The policy, whose main goal was to promote international partnerships, is divided into five key objectives:

1. Build ICT infrastructure to make Rwanda an ICT hub in Africa
2. Develop a pool of human resources in ICT
3. Promote the creation of ICT SMEs
4. Support the development of SMEs and provide tax incentives to foreign firms seeking partnerships with Rwandan firms
5. Promote entrepreneurship and innovation

The government also intended RDB to create business for Rwandans and foreigners, and to connect Rwandan firms with international partners.

The analysis of the policies and policy instruments discussed above suggests that Rwanda's institutional environment promotes the development of capabilities among local small-scale tech firms. It provides a conducive environment for international collaboration between small-scale foreign and local firms within the national innovation system, thereby preparing local small-scale firms for partnerships. Also, Rwanda achieves the new mode of collaboration by equipping small local tech firms for international collaboration with foreign entities through tailored ICT training programs for human resources in small tech companies, and by offering essential funding for innovation and entrepreneurship such as RDB innovation funds[40] and Hunger pitch[41] . However, SMEs observe that the existing funding and support mechanisms are insufficient. Therefore, as suggested by most interviewees, adopting an SME funding policy may resolve this issue and help support these small-scale firms.

Moreover, the results show that JICA has played an essential role in developing this new mode of cooperation by assisting the Rwandan government in formulating and implementing its ICT infrastructure policy, which is crucial for the operation of small-scale firms. JICA has also been instrumental in building the capacity of small tech enterprises, startups, and incubators, thereby preparing them for this new form of collaboration. Additionally, JICA supports government agencies in matching Japanese firms with small-scale companies from

[40] RDB Innovation Funds is a business competition aimed at nurturing innovation within small companies.

[41] Hunger pitch: is a business development fund innovation Competition where promising projects are identified and subsequently supported through incubation.

Rwanda, fostering international partnerships and collaboration. Without JICA's help, this type of new cooperation might not have been effective for Japanese firms.

However, the success of the above case of this new mode of cooperation, between a small-scale firm from Rwanda and one from Japan, may have been due to the fact that the two companies had the same business goals. It is worth noting that the priorities of small-scale firms in developing and developed countries can differ significantly, which can make it difficult to establish successful collaborations. Additionally, power imbalances and resource disparities between firms from varied economic contexts can complicate these partnerships.

5.1.2.2. Conclusion : Chapter 4

This study conducted a detailed examination of the development of a new type of international collaboration, between small-scale firms from developed and developing countries, focusing on Rwanda and Japan. The results provide evidence that this new mode of collaboration is mainly facilitated through matching events organized by public institutions such as the Rwandan Development Board and the ICT Chamber, with support from international organizations such as JICA and JETRO. Firms in developing countries are seeking to access new markets, develop new products, and expand their businesses, while firms in developed countries are seeking to gain access to affordable IT human resources via the impetus of this new collaboration.

Additionally, the findings of this study show that learning occurred during the process of correcting software defects and that WiredIn enhanced its innovation capability through a catch-up process, learning from Rexvirt's experience. However, the successful enhancement

of WiredIn's innovation capabilities through these international collaborations depends crucially on its learning intent and the capacity of its engineers to absorb such input.

Moreover, the study illustrates that Rwanda's institutional environment has been intentionally developed with well-defined policies to support this new type of cooperation. This support includes building ICT infrastructure, developing a pool of ICT human resources, promoting the creation of ICT SMEs, providing tax incentives to foreign companies interested in investing in Rwanda, and offering funding to tech SMEs to support innovation. The findings contribute to knowledge about international learning promotion and policymakers' insights into the promotion of international collaboration by elucidating the mechanism about which African small-scale firms to contribute to global knowledge, through interaction with small-scale firms from developed countries.

5.2 Concluding remarks

In this section we draw conclusions based on the answers to the research questions, as reported in the various sections.

Answer to research questions:

- *RQ 1: How does national policy prompt private partnerships between private foreign firm and startups in the area of emerging technology?*

In my examination of the role of national policy in promoting private partnerships for knowledge transfer in startups, I observed that SSA countries, such as Burundi, with similar characteristics, have implemented economic growth policies in place, but have not achieved the same level of success as Rwanda in attracting private partnerships to support their startup ecosystems. The macro assessment of Rwanda's national policy provides evidence that Rwanda has effectively fostered partnerships between foreign firms and local startups. Rwanda's long-term ICT strategy, outlined in the National Information and Communication Infrastructure (NICI I, II, III), has established a clear, incremental vision of transforming the country into an ICT hub. Also, by adopting innovation policy, SME policy, EDP policy, and tax policy shortly after its ICT policy, Rwanda successfully created a conducive environment that attracted foreign direct investment (FDI) and nurtured a thriving ICT startup ecosystem. This strategy has been pivotal in shifting the economy from agriculture-based to ICT-based, in turn attracting private investment in the ICT sector. The findings from the case study show that Rwanda's well-designed national policies can facilitate the formation of partnerships between foreign tech firms and Rwandan startups through a gradual and consistent implementation process. The Rwandan government has shown a strong commitment to the

orderly adoption of policies, effectively timing the introduction of new policy initiatives, strategically combining them when needed, and conducting periodic evaluations to refine and guide future policies based on lessons learned.

- *RQ 2: What are the factors of national policy that contribute to the attraction of private international firms in developing countries?*

Regarding the factors of Rwandan national policies that contribute to the attraction of private international firms in developing countries, our interviews with stakeholders and literature-based findings provide strong evidence that that Rwanda's policy success depends on several key institutional factors: (i) conducive legal framework environment; (ii) policy flexibility and agility; (iii) learning & capability building; and (iv) infrastructure. The findings of this study demonstrate that establishing conducive legal frameworks is vital for creating an investment-friendly environment; and that the flexibility and agility of policies can enable the creation of new ICT markets essential for attracting collaborations that bring foreign knowledge to startups, as seen in the case of Rwanda. Despite the uniformity of responses in our interviews, in terms of the capacity of the policy to attract private investment, the results also indicate that the maturity of the startup ecosystem may have been a main reason for these investments. However, all of these factors depend heavily on transparent government vision, political will, good institutional coordination, and the establishment of public institutions like RDB, RISA, and NCST to guide the implementation and enforcement of policies, as seen in the Rwanda success story. Moreover, providing essential resources and specialized training in sectors such as ICT is vital for fostering successful partnerships between foreign firms and domestic startups.

- *RQ 3: What is the mechanism of development of the new model of international collaboration between small-scale tech firms from developed and developing countries?*

Traditionally, international cooperation among firms is seen as driven by government action such as policy in favor of MNC to promote knowledge transfer in developing countries. The majority of studies view this old model of cooperation as knowledge transfer flow from the headquarters of multinational corporations (MNCs) to their local affiliates, facilitating learning and catch-up processes in developing countries (Castro & Moreira, 2023; Deo et al., 2002). However, examination of the case of the partnership between small-scale Japanese and Rwandan ICT firms in the software outsourcing business offers new perspective to the literature on knowledge transfer and creation. I demonstrated how this new model is developed through some initiatives from developing and developed countries. The findings of this study indicate that this new collaboration mode is primarily facilitated through matching events, organized by public institutions such as the Rwandan Development Board and the ICT Chamber, with support from international organizations such as JICA in Rwanda while in Rwanda JICA and JETRO (*refer to section 4.5.1 and Figure 20*) . As far as motivation, these matching events are intended to enable firms in developing countries seek to access new markets, develop new products, and expand their businesses, to support firms in developed countries in accessing affordable IT human resources through this new type of collaboration.

- *RQ 4: What are the effects of adoption of this new mode?*

Examination of the case of international collaboration in software development outsourcing business between Rexvirt and WiredIn yielded results showing that small-scale companies in Rwanda are depending progressively more on collaborative plans with foreign firms from developed countries in their efforts to access or obtain knowledge, and to develop their capacities through training and knowledge sharing. The findings of this study provide evidence that this new mode of international collaboration (a) is facilitate the enhancement of the innovation capability of small tech firms via knowledge sharing between the two entities, and (b) ensures that the quality of the products developed by local firms meets international standards (*refer to section 4.5.2*).

The partnership between Rexvirt Communication and WiredIn Ltd had a considerable impact on WiredIn's software development and marketing capabilities. For instance, WiredIn improved its innovation capabilities by learning from Rexvirt's experience and addressing software defects through a catch-up process. However, the success of the enhancement of WiredIn's innovation capabilities through this international collaboration relied heavily on the company's learning intent and the ability of its engineers to absorb new knowledge. The collaboration also benefited Rexvirt by enabling the Japanese firm to reduce operating costs through access to highly skilled yet affordable labor in Rwanda, facilitating the production of high-quality products that meet client expectations in Japan and other developed markets. Additionally, Rexvirt expanded its business by opening a new department focused on connecting Japanese firms with partner firms in Africa.

- *RQ 5: What was the impetus for initiating the collaboration?*

The findings of this study indicate that Rwandan small tech firms are motivated to initiate collaborations in order to access new markets, acquire skilled human resources, and engage in product co-creation. For those reasons, they actively seek out partnerships with small tech firms from developed countries to facilitate external knowledge creation. Similarly, small-scale firms from developed countries pursue collaborations with their counterparts in developing countries to reduce production costs and gain access to IT-skilled workers at a lower cost (*refer to 4.5.2*.)

- *RQ 6: What supporting policy system had been designed intentionally to enable this kind of collaboration?*

The findings of this study strongly suggest that Rwanda's institutional environment was purposefully developed with well-defined policies in place to support such cooperation. These policies were specifically designed to build a robust ICT infrastructure as the backbone of digital development and services; develop a skilled ICT workforce to help local companies absorb new technologies; promote the creation of ICT SMEs and tech startups to drive innovation; provide tax incentives to attract foreign investment; and provide funding for tech SMEs to foster innovation (*refer to section 4.5.3.)*

- *RQ 7: What role(s) did international organizations play in this new model of collaboration?*

The findings from the interviews and secondary data indicate that JICA played a significant role in fostering new collaborations in Rwanda. JICA assists the Rwandan government in formulating ICT policies and provided technical support to develop the startup ecosystem by

offering specialized training to tech startups, incubators, SMEs, and students in both Rwanda and Japan. Moreover, JICA supported the Rwanda Development Board by facilitating partnerships between Japanese and Rwandan firms and organizing events such as pitching trips to Japan. In Japan, JICA and JETRO also encouraged private companies to invest in Africa by providing financial support and assistiance in information gathering and feasibility studies through its Proposal-Based Programs with the Private Sector (*refer to section 4.5.4*).

5.3 Policy Implications

National policies are powerful tools for governments to transform their economies from agrarian to knowledge-based, thereby (a) creating an environment conducive to the attraction of private foreign investment and (b) fostering a thriving startup ecosystem. Rwanda's successful transformation suggests that, other developing countries aiming to attract partnerships and knowledge into their startup ecosystems need to consider several policy implications. In that light, I make the following recommendations and comment on a number of policy considerations:

i. Rwanda's experience shows that policy implementation strategy and institutional factors are two elements that affect the attraction of foreign investment and knowledge into startups. Thus, the governments of developing countries need to adopt a gradual, consistent policy implementation process, in which the government demonstrates a solid commitment to both policy adoption and execution, with some periodic

policy evaluations to inform the development of subsequent policies, drawing on lessons learned by specialized public institutions.

ii. Aspiring governments should have policy instruments that:
(i) promote the development of ICT infrastructure and services;
(ii) promote STEM education to create a strong foundation for ICT capabilities;
(iii) promote the building of human resource capabilities (investing in education, ICT training, and capacity building of public officers to enhance their abilities and align their goals with the government's vision);
(iv) create a conducive business-friendly environment to attract international investors, by offering tax incentives; and
(v) promote flexible and agile policy that is open to the introduction of emerging technologies. This recommendation is consistent with the observation by a number of studies that developing countries eager to achieve economic growth should consider formulating agile and flexible policies and regulatory institutions to attract the new knowledge and emerging technology that startups need to overcome local obstacles (Featherston et al., 2016).

Moreover, the examination of international cooperation between small-scale firms from Rwanda and Japan provides evidence that this new mode of collaboration can be facilitated by government initiatives, such as strategic matching programs. Moreover, firms in developing countries can enhance their innovation capabilities and learn through processes

such as addressing software product flaws, all of which would enable them to catch up with more advanced economies. Moreover, a well-defined planned policy strategy for creation of a conducive institutional environment has also been crucial for successful adoption of this new collaboration mode.

To promote this model of cooperation, other developing countries can adopt policy strategy that includes the following phases:

(i) building robust ICT infrastructure;

(ii) developing a skilled ICT workforce;

(iii) encouraging the creation of ICT SMEs;

(iv) supporting the growth of these SMEs and offering tax incentives to foreign firms seeking partnerships; and

(v) promoting entrepreneurship and innovation through public institutions dedicated to marketing local companies and facilitating partnerships with foreign firms.

These recommendations are consistent with the existing literature, which argues that the institutional environment should provide the conditions necessary for international collaboration between private foreign firms and local startup firms, which can lead to knowledge transfer and creation (Amsden, 2001; Etzkowitz & Dzisah, 2008).

5.4 Future Research

This study examined the national policies implemented in Rwanda, and international collaboration within the information technology sector there, specifically in the context of software development outsourcing in Rwanda.

In the case of the first study on the impact of national policy implemented in Rwanda, we are aware of the limitations inherent in deriving a general understanding of a shared understanding from a single case in a single country, especially since there are some limitations related to data availability and resources. We did compare the case of Rwanda with that of the Burundi. Moreover, there may be a limitation to the replicability of the strategy adopted by Rwanda in other African countries. The success of the policy in Rwanda may have been due in part to the size of the country or the fact the country has limited natural resources or because guidance leadership has been in power for a long time, which enabled the development of coherent policies and implementation of them from start to finish.

The above limitations also present opportunities for future studies. Further exploration of this question via similar studies (two or more countries and the process by which the emerging service produced by partnership can contribute to socio-economic development) is required to verify the observations presented here.

Furthermore, our second paper focuses on the interaction between two companies in the area of software development. Future studies are needed, not only for the same sector,, but also to extend the scope of this study to other sectors such as agriculture or services so as to gain a more comprehensive understanding of how international collaboration influences the innovation capabilities of small firms across diverse industries.

Appendix1: Table 16/Data collection and Analysis

Table 16: Data collection and Analysis

Primary data: Interviews	Interviewees	Secondary data	Data treatment and analysis
Ministries (MINICT)[42]	1	• National Policies, • Official public reports. • Online articles	- Analysis of qualitative data: parameters identification and keywords - Classification: Thematic analysis, combination of perceptions - Chart, graphs and figures presentation
Policy Making Public Agencies (RDB, NCST)	2		
Private Sector: 250STARTUP, Leap Lab, WiredIn Inc.	4		
University (UR, RP)	2		
Bilateral cooperation Agency (SEAD West Project, GIZ, Expertise France, JICA)	4	Reports	
Private Foreign firm (Rexvirt)	1		

[42] *MINICT: Ministry of ICT and Innovation.*
RDB: Rwanda Development Board.
NCST: National Commission for Science and Technology.
SEAD: Strengthen Education for Agricultural Development (SEAD) in the Western Province.
IPAR: Institute for Policy Analysis and Research.
UR: University of Rwanda.
RP: Rwanda Polytechnic.
JICA: Japanese International Cooperation Agency.
GIZ: Deutsche Gesellschaft für Internationale Zusammenarbeit.
Expertise France

Appendix 2: Table 17/List of interviewees

Table 17: List of interviewees

Company	**Location**	**Sector**	**Description**	**Nb. of employees**	**Nb. of interviewees**	**Position of the interviewees**
Company 1	Japan	IT System development and Consulting	Support for smartphone app development using offshore development, web service planning and design support, development, and operational support	35	1	CEO
Company 2	Rwanda	IT outsourcing and the offshore software development business	Software development, website integration, customizing E-commerce, IoT Device and Service Development and Infrastructure	20	1	CEO
Company 3	Rwanda	Incubator and acceleration hub	fostering technology startups from incubation into expansion phase through financial, legal, technical, and mentorship support among others.		1	CEO
Company 4	Rwanda	Online Incubator and acceleration hub	Online platform to facilitate the swift and effective development of products or services.	2 ~ 10	1	CEO
Publics Institution						
Public organization	Rwanda	STI	Policy development		3	Public officers
International organization		Biliteral cooperation	Assistance		4	

Source: Authors' own compilation from data collected

Annex: questionnaires

Interview Guide # Startups/Incubators

Company Name: Date: *I I* Unit:

1. INTRODUCTION

Purpose of the interview:

1. Learn more about how international inter-firm cooperation help startups to uplift their innovation capability.
2. Learn how startups are able to leverage from legal framework put in place by public institutions and how existing legal framework(policy) inhibit the activities of startups.
3. The term collaboration or partnership used in this questionnaire refers to a business that works together to achieve a defined, common business purpose.
4. The term partnership used in this questionnaire refers to a legal arrangement that allows two or more people to share responsibility for a business.

Consent to take part in this research

I have agreed to participate in the research study, and I have been informed that the research may not directly benefit me.

My participation is completely voluntary.

I agree

RESPONDENT

Title: Phone: Email: _____

- How long has it been since your establishment of your startup?
- What is your role in your startup?
- What is your startup's main business and activity?

1. Partnerships
1) Nature of the Business
Do you collaborate with external firms? Yes or NO
- If you said Yes, in what areas of work do you collaborate and why?
For how long have you been collaborating?

How much of your business or technology being done through partnership/collaboration with other firms?
In what area of your business operation do you have partnerships?

2) Nature of Partnerships/collaboration/
How many partnerships or alliances do you have?
Do you have an international partnership or domestically?
What is the nature of your partnership/collaboration or alliance?
How do you identify a company to enter into a partnership?
What challenges have you experienced in entering into a partnership?

3) Expectations, Impact and Outcome of Partnerships
What was your motivation for having partnerships/collaboration?
Did you obtain things as you expected? How was the outcome?
What was the unmatching factor of expectations and outcome of the partnership?
What benefit do you think you provided to your partner in partnership with?
What is your view concerning Japanese bilateral cooperation? Do you think it is different from other cooperation?

4) Experience sharing
What are lessons learned through partnerships?
How would you rate your overall partnership experience?
what might have been a barrier for successful partnership?

2-2. Legal Framework

1) Have you benefited from any policy/regulation aiming to support startup growth? / What did you benefit from the policy/regulation?
2) Does the current policy promote inter-firm cooperation or alliance between foreign firms and local startups?
3) Does the existing legal framework/policy attract foreign investment in local startups?
4) What sort of state support would improve your business?

Interview Guide # International firm

Company name: Date: *I I* Unit:

1. INTRODUCTION

Purpose of the interview: To understand potential of partnerships with African start-ups and how start-ups can match to secure partnerships.

Consent to take part in this research

I have agreed to participate in the research study, and I have been informed that the research may not directly benefit me.

My participation is completely voluntary.

I agree

2. RESPONDENT

Title: Phone: Email: _____

1. Do you have interest in business in Africa?
   a. If yes, why do you choose Africa for your business and why do you choose Rwanda?
   b. What attract you to this country
2. Do you do have partnership/ collaboration with a local firm/ start-ups or public institution?
3. What are the aspects of your collaboration?
4. In partnering/collaborating with African start-ups, what would be the major criteria you would judge the potential based on?
5. What are the steps for establishing partnerships/collaborating?
6. What are the criteria to consider before entering in partnership or collaboration?
7. Have you been in discussion of entering partnership with African startup? If yes, what was the outcome of the discussion, and could you share why it resulted in the way it did?
8. What are the lacking elements /shortcomings for African Startups from your point of view?
9. Do you think that this partnership improves the startup innovation capability if no, why?

What the African start up need to do more?

10. Do you think it this partnership or collaboration helped your firm? If yes, in what way, did the partnership help your firm?
11. What challenges did your company faced when it was Identifying the right partner and establish partner. How did the international cooperation scheme help in such process?
12. How do you find the policy framework of the country where you have partnership with the startup?
13. Do you think that policy attract private foreign investment?
14. What kind of conditions need to be there for foreign company can be able to invest in the country

Interview Guide # Government/Research institution

Ministry: Date: *I I* Unit:

1. INTRODUCTION

Purpose of the interview: Learn more about how national policy influences the intern-firm cooperation between foreign firms and local startups and how inter-firm international cooperation helps startups to develop their innovation capability.

Consent to take part in this research

I have agreed to participate in the research study, and I have been informed that the research may not directly benefit me.

My participation is completely voluntary.

I agree

2. RESPONDENT

Title: Phone: Email: _____

- How long did you work for this the Research institution ……?
- Which position(s) did you occupy?

1. Does the country have any national policy to support startups? If yes, please explain what they are, aims, duration and current status of its use.
2. What is the purpose of that national policy?
3. What is the major role of the government in that national policy execution?
4. What challenges does this policy want to solve the most?
5. Does this policy have a role learned from? And if yes, which is that country or community?
6. How do you engage startups in the policy framework?
7. How do you measure the success of the national policy?
8. What impact do you think this policy framework has brought?
9. Does the national policy or regulation contribute to startup growth? If yes, how does it contribute to startup growth?
10. What are the policy instruments provided by the government to support startups?
11. Does the country have some policy framework promoting inter-firm international cooperation or alliance between the foreign firm and local startup?

12. Does the policy framework take into account the investor's protection?
13. Does the policy environment favorable to introducing or developing new technology? If yes, why? and could you elaborate more and provide some examples?
14. What role or action does the government play in attracting some tech startup that helps the government solve social problems like Zipline? Do you have the number of people that benefit from this startup's service?
15. What final feature/functionality/capability does your country wish to equip the policy framework? And how do you coordinate with other policy to have a good policy mix?

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