**Central Africa: Rwanda’s Digital Rebirth**

**Post-genocide efforts to rebuild through ICT**

Rwanda is a small landlocked country located in the east-central Africa. The capital of Rwanda is Kigali. Due to the country’s ethnic tension between the majority Hutus and minority Tutsi, it accumulated and led to the horrible genocide of 1994. The genocide destroyed Rwanda’s economy and alongside its human capital as most of the people fled the country by foot. It is important to note that Rwanda has achieved impressive progress since after the genocide. The country’s economy before the conflict relied heavily on agriculture as the country’s primary exports were Coffee, Zirconium ore and other minerals and metals as the country is predominantly rural with approximately 90% of the population is engaged in subsistence agriculture. Rwanda has taken numerous initiatives in rebuilding their economy such as joining the East African Community to promote regional trade (GESCI, 2017).

The government of Rwanda recognized the role of Information Communication sector in rebuilding. The Ultimate goal is to transform Rwanda into an information- rich, knowledge-based society and economy by modernizing its key sectors using ICT. The Rwandan ICT for development (ICT4D) or National Information Communication Infrastructure (NICI) process began in 1998 under the auspices of the African Information Society Initiative (AISI) of the United Nations Economic Commission for Africa. By the year 2000 the government had put the ICT4D in place and followed it up with the development and implementation of the NICI-2005 plan. The first of the envisage four continuous plans to be developed and implemented within the 20-year time frame of vision 2020 (Government of Rwanda & Ministry of Infrastructure, 2006).

The NICI policies were incorporated into vision 2020, the Rwanda development framework developed by president Paul Kagame. In line with the transitioning from a predominantly agriculture economy (PAE) to a predominantly information rich knowledge-base economy (PIKE) the government has committed to the implementation of the four rolling NICI/ICT4D plans over the life span of Vision 2020 (Government of Rwanda & Ministry of Infrastructure, 2006).

The goals are as followed:

* The First NICI Plan (2001-2005)
* The Second NICI Plan (2006 – 2010)
* The Third NICI Plan (2011 – 2015)
* The Fourth NICI Plan (2016 – 2020)

The first three plans aimed to support economic growth and transition Rwanda into a knowledge-based, highly competitive economy by prioritizing the use of ICT goods and services to enhance service delivery across government and various economic. A key focus was on equipping citizens with general ICT skills to meet the demands of government operations.

One of the most strategic initiative within the three phases is the One Laptop per Child program that aims at the enhancement of education through the introduction of technology in primary schools. The OLPC has been very successful as it is recorded that over 200,000 Laptops have been deployed in 933 schools with the process still on- going, and training of over 9300 teachers (REB, 2025).

The primary objective of the Fourth NICI Plan was to support Rwanda in achieving middle-income country status by fostering the production and delivery of ICT goods and services. As part of this evolution, Rwanda has witnessed innovative developments, such as the “ICT BUS” a luxury commuter bus equipped with modern technology. Passengers use a smart-card ticketing system known as *Twende* for seamless and efficient payment. The buses act as a mobile tele-center for the rural citizens to access ICT services such as the internet alongside additional services from printing, scanning and photocopying documents (Masimba, 2011).



ICT Bus in Rwanda

Rwanda's ambition to become a regional high-tech hub has earned it the nickname "Singapore of Africa" (Masimba, 2011). The country's focus on ICT development has significantly boosted its economy, creating a favorable environment for investors and businesses to thrive. According to the World Bank, this strategic shift resulted in a remarkable increase in foreign direct investment (FDI), with inflows rising from $8 million in 2005 to $118.7 million in 2009. More recently, in the first half of 2024, FDI surged by 63%, reaching $289 million compared to $177 million during the same period in 2023 (FDIinsider, 2024).

**Kigali The Smart City**

“*We don’t want to be a status quo country or status quo people. Vision 2020 was about what we had to do in order to survive and regain our dignity. But Vision 2050 has to be about the future we choose, because we can, and because we deserve it…”* - President Paul Kagame, 2015.

Social and economic change, environmental sustainability, governance, and institutional development are the main focuses of Rwanda's Vision 2050. The Rwandan Development Board, the Rwandan Ministry of ICT and Innovation, and the pan-African investment platform Africa50 announced the Kigali Innovation City (KIC) as a step toward realizing the future Rwanda has chosen (Ministry of Finance and Economic Planning & Government of Rwanda., 2020).

Kigali Innovation City is a master-planned, mixed-use center that aligns with Vision 2050. The Rwandan government owns the 61 hectares of land in Kigali's special economic zone where the city is being built. University campuses, business hotels, grade A and incubator office spaces, and research and development facilities will all be included in the projects. When finished, the project is expected to cost about $300 million and have a $2 billion value, with $150 million in ICT export earnings annually and over $300 million in foreign direct investment.

This project is intended to generate 2,600 students and more than 50,000 jobs annually, producing tech- savvy Rwandan entrepreneurs (Awowede, 2024). Thus, earning the title “The Singapore of Africa.

**Investments in ICT literacy and broadband connectivity.**

By 2002, Rwanda had only two internet service providers and 25,000 users out of a population of 8.1 million, according to a report by the Rwanda Utilities Regulatory Agency (Masimba, 2011). The NICI first stage laid the foundation for ICT literacy and broadband connectivity and thus creating innovative results and records. By 2011, the number of internet service providers increased from 2 to 10 with over 1.2million users.

Also, The Government of Rwanda completed a nationwide 2,300-kilometer fiber optic cable that connects the country to the outside world by means of seacom undersea cable along the east coast of Africa providing fast internet access to a wider range of broad band services. One in four Rwandans owned a mobile phone in 2010 and as of January 2023 75.9% of the total population have mobile phone connection summing up to a total population of 11.7 million people (Bosco, 2023).

The Rwanda of today has successfully made the internet widely available and present in all sectors and to every citizen connecting rural and remote communities to the world.

**Case studies like Irembo (e-governance platform).**

Irembo, which translates to "gateway," is an electronic citizen portal created to give individuals access to public services. Launched in 2015 as a public-private partnership, Irembo is an e-governance platform that helps the government manage digital platforms and workflows for operations, payments, and service delivery. Among many other services, these include immigration and emigration, as well as family and social issues (such as birth certificates, Marriage and even death certificate), National Id Application and replacement, land ownership or transfer of ownership amongst many others. Since its launch, the website has reportedly handled over 25 million applications, reduced the number of days that individuals receive services from five to twenty-four, created over 7,000 employment, and produced over $300 million in online payments to the government (DIAL, 2024).

Irembo is a platform that has showed extreme success to the vision 2020 and has regained the dignity of Rwanda through service delivery to their citizens and public transparency which has greatly declined corruption in the country. Irembo is simply bringing the government to the house of the people.

**North Africa: Egypt’s Digital Expansion**

Vision 2030 is Egypt strategic blueprint for advancing digital infrastructure, modernizing public administration and utilizing AI in urban planning. The country has made notable achievements such as the launch of over 130 automated government services, a national broadband plan and increased digital literacy. The government of Egypt has allocated over EGP 60 billion to enhance internet efficiency and developed the “Digital Egypt Platform” with over 90 digital services.

Initiatives such as the Egyptian-African Telecom regulatory training center and the Academy for information systems support and digital transformation are important in enhancing digital governance. Egypt has collaborated with global tech leaders such as Microsoft and amazon web services and provided specialized training for young professionals in digital transformation, Big Data and freelancing which has benefited over 300,000 to trainees. Then the “Hayah Karima” which means decent life is an initiative that drives to increase computer literacy in rural communities (SIS,2023).

The Information Technology Industry Development Agency (ITIDA) is a major key play in ensuring the promotion, integration and adaptiveness of digital technological tools and supporting government agencies in their continuous efforts to design systems that are efficient and easy for everyone. This agency has partnered with the United Nations Development programme and produced several results such as the creation of 31,000 jobs, delivery training for 1,550 entrepreneurs and supported over 1,800 startups across Egypt (Convocar, 2025).

The financial sector in Egypt serves as a good example of the country’s growing digital infrastructure and the impact of public – private partnerships. A key player driving the transformation is the Commercial International Bank (CIB). CIB is one of Egypt’s largest private sector banks and the forerunner of digital innovation, particularly through it “Bank of the future” initiative. This initiative incorporates robotic process automation (RPA). By the end of 2022, CIB’s RPA system had recorded over 1.25 million successful transactions. Thus, serving as financial example to other banks in the country. This initiative highlights how private-sector innovation coupled with the support from government regulations speaks volumes to the modernization of Egypt (Abaza, 2023).

The development and implementation of a national broadband plan that increases internet penetration has established Egypt as a regional leader in digital connectivity having the fastest fixed internet speed in Africa at 76.4 Mbps. Home to over 600 tech startups, many of which are making significant impact across the MENA region. It is important to highlight the ICT sector contributes approximately 5.8% to the country’s GDP, generating an estimated $6.5 billion in revenue. The Egypt’s startup ecosystem has experienced significant growth especially in the fintech sector, contributing to the nation’s digital economy. Startups such as Fawry the largest digital payment network that processes over 9 million daily transactions, Paymob that serves over 350,000 merchants. Also, MNT-Halan the first unicorn in Egypt is a microfinance that offers digital lending and financial solutions, while Yaoota is the Egyptian version of google shopping. These startups exemplify Egypt’s dynamic entrepreneurial landscape addressing local challenges and contributing greatly to the country’s economic growth (Chevas, 2024).

Vision 2030 has been a helpful guide in achieving the Egypt envisioned as the government has played an active role in enhancing ICT development in all sector including private-public partnership. Agencies like ITIDA and banks such as CIB illustrate how public policy alongside with privet innovation is fostering the country’s digital transformation, creating a favorable environment for establishment of new businesses and training of bright young minds as over 30% of Egypt’s population comprises of youths. Egypt’s is truly becoming the technology hub of the North.

**West Africa: Nigeria’s Digital Transformation**

Nigeria is the largest economy and most populous country in Africa, leading by example as the big brother of Africa it began its execution of her ICT plan in 2001, when the federal executive council agreed and formed the National Information Technology Development agency (NITDA) as the implementing agency. The guidelines allow NITDA to develop strategic partnerships and joint ventures, as well as collaborate with the private sector, all with the objective of making Nigeria an IT-capable African country and a prominent member in the information society.

The aim for this digital revolution is to reshape key sectors such as finance, healthcare, the military, education and commerce so as to foster economic growth, curb insecurity and promote innovation. Alongside NITDA the government of Nigeria implemented various initiatives to achieve digital transformation such as:

* The National Telecommunications program 2001
* The start-up act 2022
* The National Digital Economy Policy and Strategy (NDEPS) 2020-2030 Frame work

These initiatives amongst many others have recorded high success towards the goal of achieving digital transformation. According to the International Trade Administration Nigeria is the largest mobile market in Africa with about 219 million subscribers, as of early 2024 more than 163 million Nigerians have internet access and a record broadband penetration of 43.5%. The telecom sector now contributes approximately 13% to Nigeria’s GDP thanks to the National Telecommunications program (ITA, 2024).

The National Digital Economy Policy and Strategy (NDEPS) has seen a level of success in empowering Nigerians with essential digital skills accounting for over 50% of the total population equipped with digital competencies as indicated in the 2021 World Bank Development Report (Oluyi, 2023). However, the framework aim is to achieve a 70% digital literacy by 2027 and 95% by 2030. To bridge this gap NITDA partnered with the National University commission, The National Youth Service Corps (NYSC), CISCO, and the Ministry of Youth and sports to ensure a 95% digital literacy record.

Another noticeable achievement made by the Nigerian government is the advancement of E-government services as key government agencies have adopted online services in their mode of operation such as;

* **National Identity Management Commission (NIMC):** For digital Identity verification and National Identity Number Integration with other services such as bank accounts and sim registration amongst various others.
* **Federal Inland Revenue Services (FIRS) :** This commission introduced online tax filing, digital tax payer verification and payment platforms to simplify and enhance tax compliance and increased revenue collection in Nigeria
* **Corporate Affairs commission (CAC):** The CAC has digitized its services, enabling services such as business name registrations, filing annual returns and other corporate compliance activities.

The startup act was signed into law in 2022 and was designed to create a flourishing environment for startups to thrive by addressing challenges such as funding, regulations and infrastructure, the provides Startup labelling that enables to eligible for incentives under the act, The Start up act also introduced the ‘Startup Investment Seed Fund’, Also provision for Incentives such as exemption from payment of income tax or any other taxes chargeable on it income or revenue for a three year period and finally Regulatory Collaboration that is focus on easing the burdens and time by startups in the regulatory compliance process. According to NITDA the Nigeria Start up act has made significant progress as 12,984 startups, 912 venture capitalist firms, 1735 angel investors and 925 accelerators, incubators and hubs have been registered on the startup portal (Olaghere & Akalezi, 2024).

According to 234Intel (2024), The Landscape of Nigerian tech startups is diverse, the Fintech sector is the leading dominant figure in the tech startup ecosystem consisting of 26.73%. Companies such as Flutter wave and Paystack have revolutionized payment systems in Nigeria, making financial transactions faster, safer and more accessible, alongside these fintech giants, Andela has a played a crucial role in shaping the country’s digital landscape.

* **Flutter Waver** was founded in 2016 by Olugalu Agboola and Iyinoluwa Aboyeji, the company has offers wide range financial services and recorded $475 million in investment and valued the company at $ 3 billion dollars in 2022.
* **Andela** is a Nigerian Education technology (EdTech) founded by 2014 by Christian Sass, Ian carter and Jeremy Johnson, the company focuses on training and securing jobs for software developers globally. The company has raised over $180 million.
* **Pay stack** was founded in 2015 by Shola Akinlade and Eze Obi it was created to change the status quo of online payments in Nigeria the company was able to raise over $8 million dollars before it acquisitions by Stripe for $200 million.

These companies have created thousands of jobs therefore reducing the unemployment rate in the country, they have also been able to attract FDI in millions and thus given the country global recognition and setting out to solve challenges within the country has inspired various entrepreneurs and innovators creating a new wave of active entrepreneurs and innovativeness in the county.

**Nigeria as a tech hub in Africa: The rise of Lagos' "Yabacon Valley.".**

Just as there is Silicon Valley a region in California that is a global center for technology innovation, Nigeria has its version of Silicon Valley knows as “Yabacon Valley” located in center of Lagos. The establishment of offices by tech companies and entrepreneurs in 2010 marked the beginning of Yaba's development as a tech cluster. An important factor in drawing tech enthusiasts and investors to Yaba was the establishment of Co-creation Hub (CcHub), one of Africa's first innovation hubs, in 2010 by Bosun Tijani and Femi Longe. Yaba was selected due to its proximity to the airport and numerous educational institutions, including the Nigerian Institute of Medical Research, Yaba College of Technology, and the University of Lagos. Notable firms including Paystack, Flutterwave, and Andela eventually called Yaba home. With more than 400 startups and a valuation of over $2 billion, Yaba has welcomed tech leaders such as Mark Zuckerbureger in 2016 and Jack Dorsey the former chief executive of Twitter in 2019 (Hayden, 2022).

Nigeria has made significant progress in transforming the country to an IT- knowledgeable base country by leveraging on initiatives such NDEPS and the Nigeria Startup Act to promote innovation, economic growth and digital literacy. With the success of various startups and emergence of startups in Yaba has solidified the name Yabacon Valley and as such has highlighted Nigeria’s emergence as a leading tech hub in Africa.

**Southern Africa: South Africa’s Innovation Ecosystem**

South Africa is another leading country at the forefront of digital transformation in Africa. The country is well known for its heavy investment in digital infrastructure across the nation due to its government proactive commitment to fostering digital growth. The department of communications and Digital Technologies (DCDT) oversees key initiatives to advance digital economy

**Digital Economy Master Plan (DEMP)**

This master plan was created and implemented in 2020 to establish a digital economy education and skills ecosystem. It was first drafted in 2020 and finalized in 202. The plan aims to support the National development plan by focusing on key areas:

* Digital Infrastructure: expanding broadband, improve internet access and rolling out 5G network
* Digital skill development: training and equipping people to close the skill gap in the country
* Digital Commerce: Growing E-commerce through better regulations and digital payment systems
* Digital Innovation and entrepreneurship: Supporting startups and small businesses with funding and innovation hubs
* E-government services and many more

By executing such strategies, South Africa has been able to gain recognition as a leader in the digital economy (International Trade Administration, 2024).

South Africa’s digital economy has become the cornerstone of its development, as it is rapidly emerging as a leading technological hub. The rise of tech-related jobs has been significant in Johannesburg, cape town and Stellenbosch. According to a report Johannesburg provide 24 tech related job roles per 100,000, Cape town provides 19 per 100,00 and Stellenbosch 36 per 100,000 (Moloko & Branquinho, 2025).

South Africa’s digital economy is currently contributing 10-15% of the country’s total GDP and projected to expand to 15-20% of GDP by 2025. The government of South Africa have invested over 11.5 billion dollars recently to establish fiber optic networks and data centers to improve connectivity, more than 74% of the total population have accesses to the internet so with the adoption of the 5G technology it is expected to contribute approximately 0.37% to the GPD by 2030. As low-band 5G network with extensive coverage will be very impactful in driving digital transformation across various sectors such as agriculture and manufacturing. The internet of things is projected to increase to 43 million in 2025 (GSMA, 2024).

The growth in the E-commerce market gained trajectory due to the COVID-19 pandemic. The pandemic has accelerated growth and currently this sector is expected to grow at an annual rate of 12% by 2025, reaching a value of $10 billion. South Africans consumers make use of online platform such as Takealot, Uber eats, Kalahari and Mr. D amongst various others (International Trade Administration, 2024).The fintech sector has also experienced remarkable growth, with businesses raising $1.5 billion in funding since 2019, according to Statista the total transaction value in digital payment market is expected to reach $19.96 billion in 2025 while mobile POS payments projected transaction value is foreseen at $12.16 billion in 2025. Notable examples of leading fintech companies in south Africa are MTN MoMo payments, Telkom and Vodacom’s Vodapay. These advancements bring south Africa under the global spotlight as a country committed to economic prosperity fueled by digital innovation (Statista, 2024).

The South African government has fully recognized the importance of adopting Artificial Intelligence (AI) and has positioned itself at the forefront of AI advancement by making significant investments to integrate AI into everyday affairs. South Africa played a crucial role in contributing to the Pan-African “AI for Africa Blueprint” of which it is a key component to the SMART AFRICA initiative supported by both the German Development Cooperation (GIZ) and the Smart Africa Secretariat. This blueprint aim is to assist member states in developing policies and strategies to drive growth and prosperity within the context of digital revolution. In 2022, department of communication and digital technologies (DCDT) launched the Artificial Intelligence Institute of South Africa (AIISA) to spearhead AI development in the country. Also, the Department of Higher Education, Training and Innovation established the WEF Affiliated center, which focuses on AI ethics alongside the Centre for Artificial Intelligence Research (CAIR), dedicated to advancing AI research (Department of Communications and Digital Technologies (DCDT), 2023).

The country has undergone significant transformation since adopting AI across key sectors such as education, government, healthcare, energy and mobility. The government aims to attract $3.7 billion in investments by 2030, supported by the establishment of 100-300 AI startups and development of 5,000 AI experts. In 2024 Microsoft announced a $70 million investment in the South Africa economy to fuel innovation, create jobs and prepare the country for the future of artificial intelligence (AI) (Empower Africa, 2024). According to Statista the market size in the AI market is projected to reach $1.20 billion by 2025 and expected to show an annual growth rate of 27.23%, which is resulting to a market volume of $4 billion by 2030.

One notable application of AI in south Africa is the implementation of AI-powered smart meters by the national power utility. The meters are designed for prepaid electricity customers, collect real time data on energy consumption and analyze it to identify vulnerable household at the risk of payment default so as to enable intervention and support mechanisms to prevent disconnection and ensuring continued energy access for those households and communities (OJTA, 2024). These advancements highlight South Africa’s commitment to harnessing digital innovation to drive economic growth, adoption of AI and foster sector- wide digital transformation.

**East Africa: Kenya’s Silicon Savannah**

Silicon Savannah is located in Nairobi, Kenya and it is a rapidly growing tech hub with over 200 startups and more than $800 million in investment. It serves as the key destination for emerging technologies such as cloud computing and AI, attracting major players such as google, Amazon Web services, IBM, and Microsoft. In May 2024, the country became the first African country to receive funding from the United States CHIPS and Science Act. In addition, Microsoft in partnership with UAE’s G42 announced the building of a $1 billion one gigawatt green data center to support AI growth and cloud services. Kenya has achieved an 85% record in internet penetration the country, its digital economy is expected to contribute up to 9.24% to the its GDP by 2025. (International Trade Administration, 2024).

One of the major markets in the Silicon Savannah is mobile technology, M-Pesa is the world’s most successful mobile phone-based financial service. M-Pesa (“M” for mobile and “Pesa” for money in Swahili) was created by Safaricom in partnership with Vodafone and was launched in 2007 and has recorded user success of over 50 million active users and is currently in seven countries. This digital platform offers wide array of financial services for retail customers, businesses and government. M-Pesa has generated over $885 million for its parent company Safaricom as recorded during the financial year ending in march 2022 (Ndegwa, 2024).

The Kenyan government is active in digital infrastructure development. In February 2023, it launched the Digital Superhighway Project to expand fiber optic coverage by 100,000 km and install 25,000 public WI-FI hotspots. Kenya generates over 95% energy through green energy, Kenya is leveraging AI to optimize solar and wind power integration into the national grid thereby reducing reliance on fossil fuels. This entirely promotes a cleaner and more sustainable energy mis for the country (OJTA, 2024). The government noticed the digital divide within the country as 70% of its total population reside in rural areas, so to reduce such divide the government implemented ICT reforms to enhance digital learning in schools, initiative led by the Ministry of Education, Science, and Technology with various partners such as Microsoft, Oracle, and the Network Initiative for computers in Education. Schools have gained access to high speed Internet, Computers, and tablets. Additionally, the government implemented the Digital Literacy Programme in 2016, this initiative has trained over 81,000 teachers, aligning with Kenya’s Vision 2030 goal of becoming an industrialized middle- income nation (Barasa, 2021).

Kenya is a leader in agtech innovation, with over 100 digital solutions enhancing productivity, growth and sustainability in the agri-food value chain. Companies such as Twiga foods, Apollo Agriculture, iCow, Safaricom’s Digifarm and Farmers pride are the forefront of this agricultural revolution. With 8.6 million farmers, 81% are smallholder framers, digital tools have transformed agriculture by enabling farmers to monitor crops, test soil and improve livestock management. For example, iCow allows farmers create profiles for their cows and with the information provided by the farmer, the app provides rearing tips, and suggest new feed techniques to their users. These digital innovations are mobile or web-bases making it simple, user-friendly and cost effective. (Chimbi, 2023). Similarly, Kenya has embraces digital technologies in healthcare, utilizing ICT to expand access and bridge geographical barriers. The ministry of Health’s E-Health policy promotes the adoption of ICT to improve wide access to health care services. This policy has led to the development of various policies such Mobile Health (mHealth), adoption of electronic health record practices to improve management and easy accessibility to data, and Telehealth that enables remote consultation via Video calls. Kenya is making significant progress in digital transformation; However, challenges remain such as low digital literacy, infrastructure limitations and cost barriers (Thaiya et al., 2021).