DIGITAL AGRICULTURE COUNTRY STUDY ANNEX: DEMOCRATIC REPUBLIC OF CONGO

Supplement to the Situational Analysis Report | Assessment of Digitalization in the Agricultural Systems of the SADC Region

Centre for Coordination of Agricultural Research and Development for Southern Africa | World Bank Group

IMC worldwide

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SUPPLEMENT TO THE ASSESSMENT OF DIGITALIZATION IN THE AGRICULTURAL SYSTEMS OF THE SADC REGION: SITUATIONAL ANALYSIS REPORT

Centre for Coordination of Agricultural Research and Development for Southern Africa | World Bank Group

2021/2022

TABLE OF CONTENTS

ACRONYMS AND ABBREVIATIONS

AI	Artificial Intelligence
AIDI	Africa Infrastructure Development Index
APPSA	Agricultural Productivity Program for Southern Africa
AR4D	Agricultural Research for Development
AU	African Union
B2B	Business-to-Business
B2C	Business-to-Consumer
CCARDESA	The Centre for Coordination of Agricultural Research and Development for Southern Africa
COVID-19	Coronavirus pandemic
DACS	Digital Agricultural Country Study
DE4A	Digital Economy for Africa Initiative
DIAL	Digital Impact Alliance
EGDI	E-Government Development Index
FANR	Food, Agriculture and Natural Resources Directorate
FAO	Food and Agriculture Organization of the United Nations
GCI	Global Competitiveness Index
GDP	Gross Domestic Product
GII	Global Innovation Index
GIS	Geographic Information System
GNI	Gross National Income
GPS	Global Positioning System
GSMA	Global System for Mobile Communications
HDI	Human Development Index
ICDL	International Computer Driving License
ICKM	Information, Communication and Knowledge Management
ICT	Information Communication Technology
ICT4AG	ICT for Agriculture
IDIA	International Development Innovation Alliance

IOT	Internet of Things
IS	Information Society
IT	Information Technology
ITU	International Telecommunications Unit
KII	Key Informant Interview
MSMES	Micro, Small and Medium Enterprises
NGO	Non-Governmental Organization
NREN	National Research and Education Networks
OECD	Organization for Economic Co-operation and Development
OSI	Online Service Index
R&D	Research and Development
RCOL	Regional Centers of Leadership
RUFORUM	Regional Universities Forum
SAAS	Software as a Service
SADC	Southern African Development Community
SME	Small and Medium Enterprise
SMS	Short Message Service
SSA	Sub Saharan Africa
TOR	Terms of Reference
UN	United Nations
UNCTAD	United Nations Conference on Trade and Development
UNDP	United Nations Development Program
USSD	Unstructured Supplementary Service Data

1 INTRODUCTION

1.1 INTRODUCTION TO THE STUDY AND THE STRUCTURE OF THE DACS

The Centre for Coordination of Agricultural Research and Development for Southern Africa (CCARDESA) is a sub-regional organization that was approved by the Council of Ministers of the Southern African Development Community (SADC) in 2010 and launched in 2011. CCARDESA promotes innovative research, technology generation and adoption of sustainable agricultural development through partnership and capacity development. CCARDESA also coordinates the Agricultural Productivity Program for Southern Africa (APPSA), a regional program supported by the World Bank to promote collaboration and to encourage technology generation and dissemination across national borders of participating countries of SADC. CCARDESA has appointed IMC Worldwide to carry out a situation analysis of the status of digitalization in the agricultural systems of SADC member states.

Aligned with the Terms of Reference, a separate report has been produced by the study team, the *Situational Analysis Report: Assessment of Digitalization in the SADC Region* which addresses the assignment objectives (Section 2.2 in the Situational Analysis Report).

This Digital Agricultural Country Study (DACS) for the Democratic Republic of Congo (DR Congo) is an annex to the *Situational Analysis Report* and provides a snapshot of the general digital ecosystem, the policy environment of digital and agricultural policies, relevant digital agricultural innovations, and an overview of digital agricultural skills and digital entrepreneurial skills development in universities, incubators, and accelerators within an ecosystem. This document is not intended to provide a full analysis of the ecosystem in this country but provides an early baseline in gathering data and information collected from voluntary respondents on these topics for possible further study.

The baseline data collected provides insights into the extent to which the DR Congo has enabled and encouraged digital technology solutions, such as the use of digital data in agricultural research, education, extension, and market access. In specific terms and to the extent possible:

- The DACS identified available public national policies and legislation which provide a conducive environment for agricultural digital innovations to thrive. The study team also reviewed the context in which digitalization is linked to agriculture to enhance the agricultural innovation ecosystem.
- The DACS provides a catalogue of relevant agricultural digital innovations and where available, their availability, affordability, usability, and potential for scalability (adoption by smallholder farmers). These innovations were characterized in use cases according to a suitable framework and mapped to the roles they play in providing solutions within fragmented agriculture value chains.
- The DACS also maps syllabi at Agricultural Universities, Colleges, Incubators, and Accelerators which have embraced digital and entrepreneurial skills training to encourage and empower young people to become digital entrepreneurs in the future.

The study has assembled a wide array of evidence and research using qualitative and quantitative methods and approaches. Data collection on digital tools reflects the extent to which they have been embraced, but it

is important to note that this study is not exhaustive in identifying every digital tool available. The report has the following structure:

Chapter 1:	Introduction to the DR Congo, including the general digital ecosystem, agriculture sector, digital infrastructure, and benchmark assessment results
Chapter 2:	The Broader Policy Environment
Chapter 3:	Digital Agricultural Innovations
Chapter 4:	Digital Agricultural Skills and Entrepreneurship Training
Chapter 5:	Insights and Reflections

All the information compiled for the DR Congo will be combined with data from the other 15 SADC member states and presented on a platform hosted by CCARDESA.

1.2 METHODOLOGY

IMC Worldwide, CCARDESA and the World Bank agreed to the framework, approach, and methodology for the assignment. CCARDESA facilitated the introduction to the Information, Communication and Knowledge Management (ICKM) Focal Point in the DR Congo, Mr. Jean-Louis Tshisambu from the Ministry of Agriculture. The study team also worked with a National Consultant in the DR Congo, Mr. Jean Pierre Kabongo.

Further information on the methodology for this assignment is provided in the *Situational Analysis Report* (Section 3) along with the data collection tools used, including the key informant guides and surveys (Annex 6-13 in the *Situational Analysis Report*).

GENERAL ECOSYSTEM

The study team collected key digital ecosystem figures for each country through a desk review of country reports and industry websites (World Bank, ITU, GSMA, etc.). These figures are presented in section 1.3 and 1.4 below.

BENCHMARK ASSESSMENT

The team completed a benchmark assessment across the 16 SADC member states. The assessment sought to provide a context to the findings of this study, and not to determine each SADC country's development of a digital economy. The approach was adapted from Unlocking the Digital Economy in Africa: Benchmarking the Digital Transformation Journey by SMART Africa and the Digital Impact Alliance (DIAL). SMART Africa's mandate is to encourage Africa's transformation into a knowledge economy through the usage of ICTs, and therefore this assessment would be most compatible to the SADC member states. Other frameworks and toolkits were reviewed in preparation for the benchmark with more information in the *Situational Analysis Report.* The assessment areas in the SMART Africa/ DIAL report are based on the five foundational pillars of the Kenyan Digital Economy Blueprint, illustrated in figure 1, and are similar in nature to the African Union's Digital Transformation Strategy foundation pillars, illustrated in figure 5, (Enabling Environment; Policy and Regulation; Digital Infrastructure; Digital Skills and Human Capacity; Digital Innovation and Entrepreneurship).

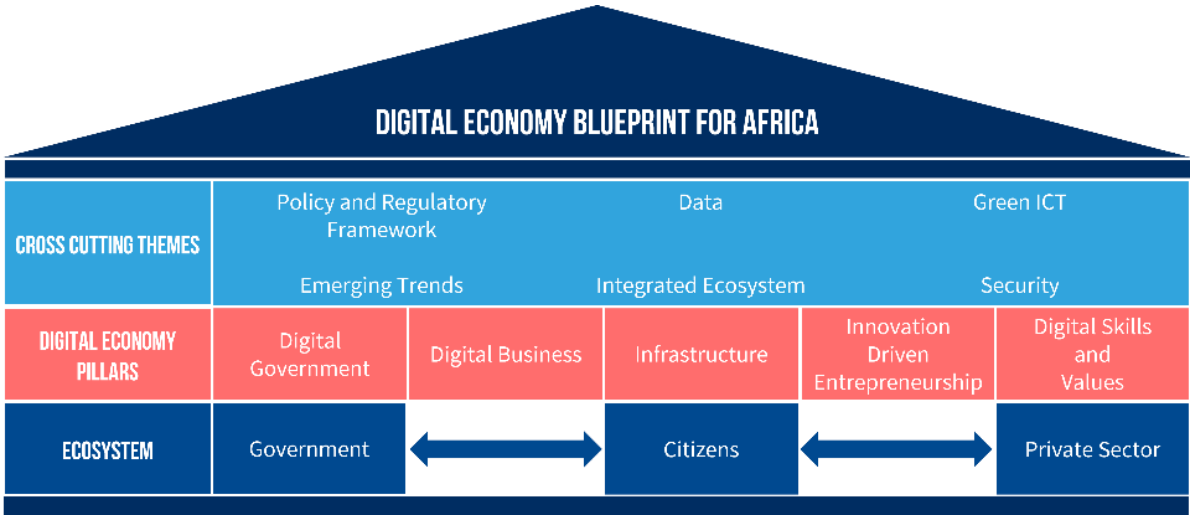

FIGURE 1 OVERVIEW OF THE KENYAN DIGITAL ECONOMY BLUEPRINT

A sixth pillar was added to the benchmark to include Policy and Regulatory Frameworks to align it with this study and as this was a regular cross-cutting area mentioned in other frameworks. These six pillars are presented in table 1.

TABLE 1 PILLARS FOR THE BENCHMARK ASSESSMENT

Digital Government	Digital Business	ICT Infrastructure	Innovation Driven Entrepreneurship	Digital Skills	Policy and Regulatory Frameworks
The presence and use of digital services and platforms to enable public service delivery,	The development of a robust marketplace for digital trade, digital financial services, and digital content.	The availability of affordable, accessible, resilient, and reliable infrastructure.	The presence of an ecosystem that supports homegrown firms to generate world-class products and services that help to widen and deepen digital economic transformation.	The development of a digitally skilled workforce that is grounded on sound ethical practices and socio-cultural values.	The presence of policies and regulations that are dynamic, flexible and promote the digital economy.

Assessing the pillars has provided a picture across all 16 countries and forms the basis of the specific indicators that were selected for the benchmark assessment. The indicators used were based on the SMART Africa/DIAL report. Changes were made to some of the indicators for this study to focus more specifically on the digital elements. For example, the ICT Infrastructure pillar uses the ICT Composite Index score, rather than the general Infrastructure indicator from the Africa Infrastructure Development Index (AIDI) that included elements such as roads. For the Digital Skills pillar, only the digital skills among active population score were used for this benchmark rather than the general Digital Skills score in the Global Competitiveness Index (GCI) which includes factors not related to digital. The indicators and data stream used and the maximum score available is illustrated in table 2.

TABLE 2 INDICES AND DATA STREAM USED FOR THE BENCHMARK ASSESSMENT AND MAXIMUM SCORE AVAILABLE

Benchmark Pillar	Index	Data Stream	Maximum Score
Digital Government	E-Government Development Index (EGDI) 2020	Online Service Index (OSI)	1
Digital Business	GCI 2019	Business Dynamism Component	100

ICT Infrastructure	AIDI 2020	ICT Composite Index	100
Innovation Driven Entrepreneurship	Global Innovation Index (GII) 2021	N/A	100
Digital Skills	GCI 2019	Digital skills among active population	100
Policy and Regulatory Frameworks	ITU G5 Benchmark 2021	N/A	100

Each SADC country received a total score based on the specific scores of each pillar, outlined above. These figures were then compiled into an index (this was done by dividing the scores by the maximum possible score). The benchmark is based on a mix of indicators from 2019-2021, outlined in Table 2. Some data was not available for all the assessment areas for the DR Congo. This was accounted for and adjusted when ranking the countries.

POLICIES

For the broader policy section, the study team identified available policies, strategies and legislation around Information Communication Technologies (ICT), digitalization, data, cybersecurity and privacy, e-commerce and transactions and agricultural sector policies through desk-based research and discussions with in-country consultants. The team undertook key informant interviews (KIIs) with available CCARDESA ICKM focal points to identify additional policies, including draft versions that may be unavailable online and to understand practical challenges around the policy environment within ministries.

The team reviewed available public policies to understand their complexity, basic goals and strategies and the relationship with agriculture within the public sector. The team took stock of relevant digital laws, although the list included in this report is not exhaustive but focused on electronic transactions and electronic commerce, cyber security, data protection and open data. Findings from stakeholder interviews were then analyzed to provide a deeper understanding of the challenges faced within the public sector and to what extent digitalization is being prioritized by Government.

The approach sought to provide an audit of the policies in the public domain illustrating to what extent digitalization is embraced by government, and the relationship and implication for the agriculture sector. The report did not seek to analyze the content of policies or strategies or assess whether they are effective, enforceable, or have achieved their objectives.

INNOVATIONS

Digital agricultural innovations were identified through a desk review of international reports, internet searches, local networks supplied by the CCARDESA ICKM focal point in the country and the national consultants. In some countries, innovations were identified that were also implemented in other countries (regional innovations), this is reflected in Chapter 3: Digital Agricultural Innovations. The national consultants validated all identified innovations available (national and regional innovations in that country) and identified contact information of the innovators which was then uploaded into a Google Form. Some regional innovations which claimed they were implemented in the DR Congo could not be fully validated, but this was insufficient to suggest they did not exist and so are included in the lists.

Each identified innovator was sent a survey by email, requesting more detail on their innovations related to the maturity, numbers of users and scale as well as more detailed characterizations of their unique innovation. Survey participants provided the survey responses voluntarily through Google Sheets which were converted

into excel files. All innovators were pursued rigorously for some weeks, by email and by phone, to encourage them to fill out the survey.

Survey answers were self-reported and where there were outlier responses, follow-ups were made to ensure conformity of information. The survey results were cleaned by combining duplicate answers (when submitted from more countries), clustered (in cases of open answers, for example with "other") and names between identified and survey results were aligned. In some cases, the answers were coded for better analysis of the data. An analysis spreadsheet was developed to analyze the data in more depth and to create the graphs. All innovations received a unique number and were uploaded to the database. The database forms the basis for the interactive web portal of CCARDESA, further information on the portal can be found in the main report, *Situational Analysis Report*. Alongside the survey, several KIIs with innovators took place both with regional innovations and with national innovations that have reached a certain level of scale.

This DACS has characterized use cases based on a model and framework created by GSMA based on different use cases and sub use cases and is represented below in figure 2. These broadly fall into access to services, access to markets and access to assets.

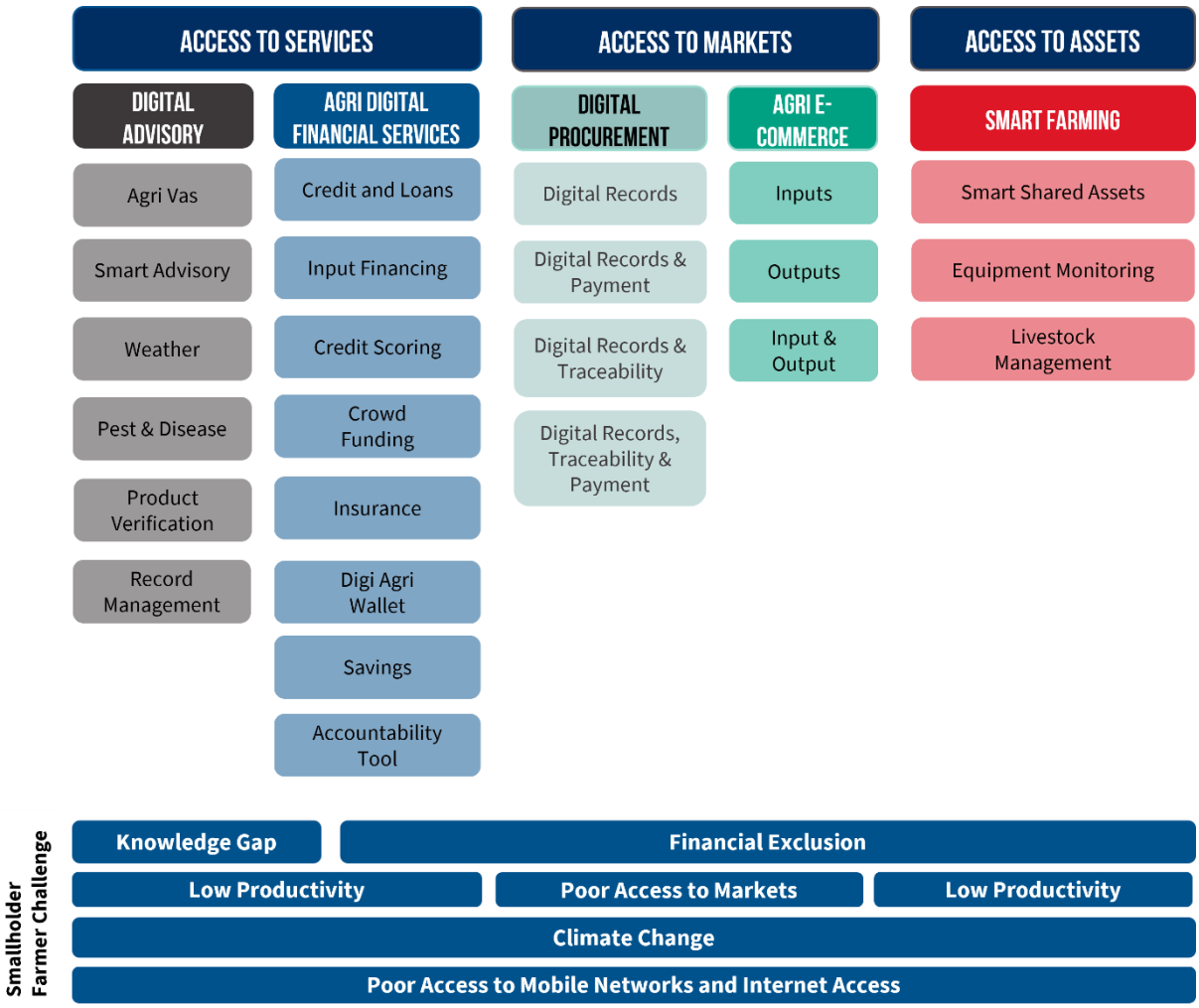

FIGURE 2 USE CASE MODEL BASED ON GSMA FRAMEWORK

In graphs and tables included in this DACS, the following color coding was used to illustrate the different use-cases:

DIGITAL SYLLABI

Digital and entrepreneurial skills training was assessed through a quantitative Survey Monkey tool sent to 54 Universities, the majority of these were Faculties of Agriculture that are part of the Regional Universities Forum (RUFORUM) network, but some institutions were contacted that were not strictly agricultural to try and provide a complete picture in the region (a total of 58 different faculties were contacted). The names and addresses of these University contact points was facilitated via collaboration with the RUFORUM University membership in the SADC member states. The study team also carried out KIIs with representatives of faculties of agriculture at selected Universities and Incubators. The full list of universities and incubators approached, tools used, and stakeholders interviewed can be found in annex 3-4 and 8-10 of the *Situational Analysis Report.*

LIMITATIONS TO THE METHODOLOGY

The planning, data collection, analysis and reporting of this study was completed between April to December 2021. Due to the Covid-19 pandemic much of the data collection and delivery of this assignment was completed remotely across the 16 SADC member states. The inability of some national consultants to conduct in-person meetings or interviews, and restrictions around national travel due to Covid-19 protocols limited the data collection and led to delays in some areas.

The data collection for this study was entirely voluntary and self-reported. Every effort was made by the study team to engage a representative sample of stakeholders under each theme and encourage completion of surveys and interviews, there are cases within some of the DACS where the data may be more limited than in others due to the maturity of the digital agricultural ecosystem. Therefore, while the data collected for each country provides a reasonable baseline of the current landscape, this overview is not exhaustive and must not be seen as such. The intention of the data collection was to address the assignment objectives which sought to understand regional trends, themes, and opportunities around digitalization in agricultural systems. The DACS are supplemental documents which present the country data collected, some of which was used in the *Situational Analysis Report*, but they should not be interpreted as providing a detailed analysis of the country ecosystem.

POLICIES

There were several challenges in obtaining policy documents and determining if they were accurate, final, or valid and implemented. The impact of the Covid-19 pandemic has affected the priorities of governments and implementation of their related policies. Furthermore, the pandemic has constrained open and full consultation of policies that have been drafted and may have delayed their finalization. Additionally, much of the documentation the team found is split between ministry websites and illustrates the siloed nature of policy formulation in this space. If documents were unavailable online then the ICKM focal points were asked for access where possible, national consultants also tried to source documents locally. Unverified versions of documents available online were also used for review.

Innovations

The current DACS is a snapshot in time as new digital innovations are in development in the DR Congo and some may be declining because of the Covid-19 pandemic. Due to various Covid-19 restrictions, physical meetings could not always take place. People had to work from home which significantly affected their ability and willingness to participate in online interviews and survey instruments. The efforts of the national consultants to convince innovators to participate in the survey required significant energy and effort and, in some cases, took longer than expected. Many innovators are very busy and mentioned that participating in another survey or interview did not equate to new opportunities for their innovation. There was also suspicion and caution by innovators and public sector stakeholders to engage with consultants and share proprietary data.

Digital Syllabi

Across the region, the response rate of universities to the survey tool and interviews was 47% which was a reasonable response rate. However, the response rate is variable between countries and the number of participating universities in some countries was much lower than expected given their diversity and maturity and contrasted highly with the much smaller nations in the region. This is believed to be due to the enormous additional workload on staff at Universities as a direct result of the pandemic forcing many to move all activities online and the time and pressures this entailed. As a result, University staff struggled to find available time for the survey.

The level of digital skills represented in the study is believed to be much lower than the reality for the region. In part, this can also be explained by the intentional targeting of Agricultural Faculties and Universities in the region rather than conducting a wider survey across Universities and Colleges more widely. During the KIIs it was also established that some Universities and Faculties struggled to see their role as part of an ecosystem actor in providing for agricultural digital skills building specifically.

1.3 COUNTRY CONTEXT

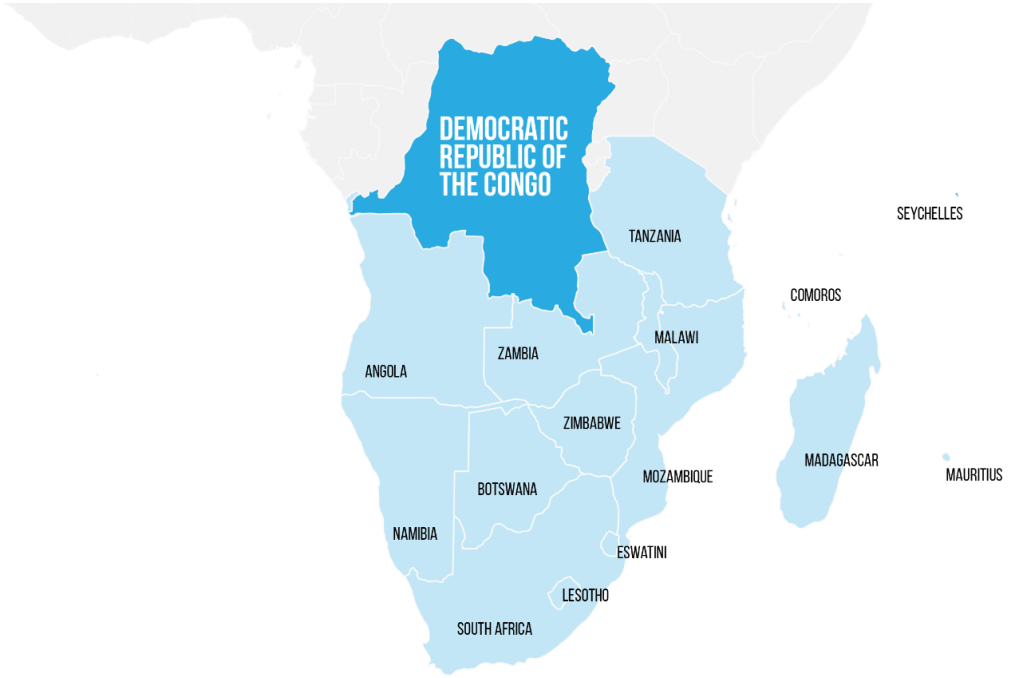

FIGURE 3 MAP OF DR CONGO IN SADC

The DR Congo is a landlocked low-income country with the largest population in SADC, 89.6 million.[1] The UNDP's Human Development Indicators[2] rank the DR Congo as 175th out of 190 countries and 15th out of the 16 SADC countries. The country scores on the lower scale in the region for gender equality with a Gender Development Index of 0.845.[i] It is the poorest country in the SADC region with a Gross National Income per capita of only $1,100 (compared to an average of $8,277 in the region).[3] Although 64.5% of the population falls under the UN Multidimensional Poverty Index,[4] 63.9% live below the poverty line according to the World Population Review.[5] This is significantly above the average rate of the SADC region of 40.8%. The median age of the DR Congo's population is also younger than the average in SADC with 17 years (versus 22.1 years). The infrastructure is dilapidated, the educational tools, equipment, materials, and textbooks in most of the academic institutions seem to be obsolete.

AGRICULTURE ENVIRONMENT

In the case of urbanization, the DR Congo is above average in the SADC region with 45% living in urban areas. Although only 20.33% of the GDP is earned in agriculture, 64.3% of the population works in the agriculture sector (higher than the average of the SADC region of 43.37%). On the Global Food Security Index, the DR Congo ranks as the 98th country with an overall score of 40.7—making it the 5th in the SADC region alone.[6]

The lack of access to agricultural innovations is a concern in the DR Congo and is often associated with low productivity, low agricultural yields obtained by producers and the low quality of products for consumers (at household and market levels).

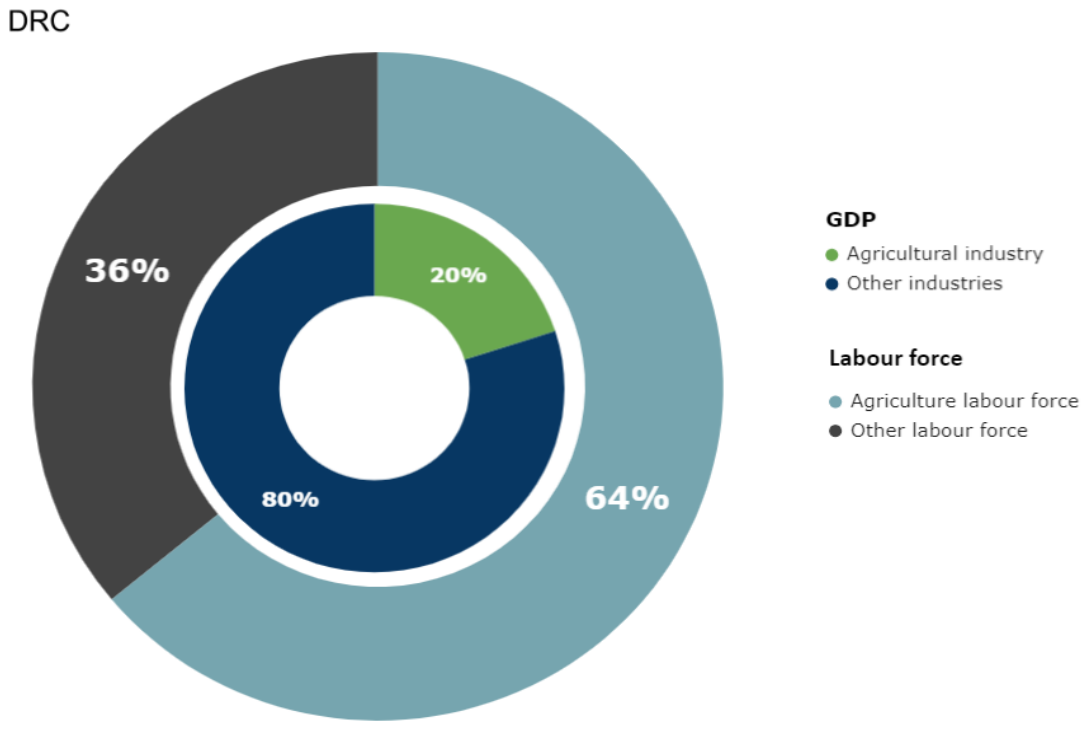

FIGURE 4 DR CONGO'S AGRICULTURAL INDUSTRY SHARE OF GDP AND THE SHARE OF THE AGRICULTURAL LABOR FORCE

[i] The Gender Development Index (GDI) measures gender inequalities in achievement in the three basic dimensions of human development.

1.4 THE GENERAL DIGITAL ECOSYSTEM

In 2020, the African Union (AU) adopted the Digital Transformation Strategy for Africa (2020-2030) which presents a vision of an integrated and inclusive digital society and economy in Africa. It recognizes the digital economy as a key factor in stimulating economic growth and jobs, reducing inequality, and promoting sustainable growth[7]. The Strategy, illustrated in figure 5, is based on foundational pillars, critical sectors to drive the digital transformation, and cross cutting themes to support the digital ecosystem.

The transition to, and importance of, a digital economy is illustrated in the prevalence of this agenda within regional institutions, donors, and multilateral organizations. Where agendas previously focused on ICTs, providing hardware and universal access, the focus is now on enabling a digital economy with a more holistic view of digital and ICTs. The digital economy considers sectors beyond the IT industry and encourages a whole-of-government approach to have more emphasis on the overall ecosystem and economy[8].

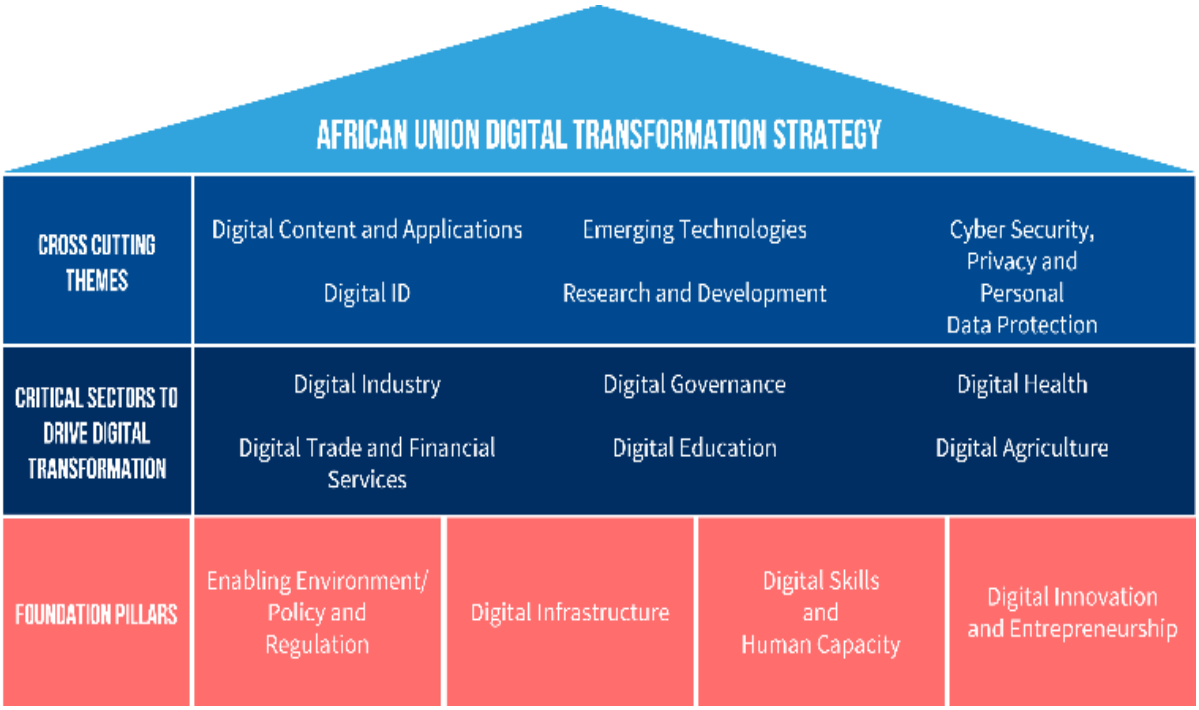

FIGURE 5 OVERVIEW OF THE AFRICAN UNION DIGITAL TRANSFORMATION STRATEGY

BENCHMARK ASSESSMENT FINDINGS

The purpose of the benchmark is to provide a context to the findings and identify where SADC countries are progressing, or where they may be behind or not developing in terms of a digital ecosystem. The benchmark assessment and the overall rankings illustrate some key front-runners in the region that are perceived to have better foundational pillars required for a digital economy. Most of these front-runners are less dependent on agriculture for economic growth, and to some extent employment. Further information on these groupings, and the assessment results, and regional trends can be found in the *Situational Analysis Report*.

The results for DR Congo are illustrated in table 3.

TABLE 3 BENCHMARK PILLAR SCORES: DR CONGO

DR Congo	Score	Maximum Score
Digital Government (OSI, 2020)	0.129	1
Digital Business (GCI, 2019)	40.500	100
ICT Infrastructure (AIDI, 2020)	7.517	100
Innovation Driven Entrepreneurship (GII, 2021)	N/A	100
Digital Skills (GCI, 2019)	N/A	100
Policy and Regulatory Frameworks (ITU, 2021)	50.330	100

The benchmark assessment identified four clusters of countries:

Group 1: South Africa, Mauritius, and the Seychelles.
Group 2: Eswatini, Tanzania, and Botswana.
Group 3: Zimbabwe, Namibia, Lesotho, Zambia, Malawi, and Madagascar.
Group 4: Angola, Mozambique, the DR Congo, and Comoros.

TABLE 4 OVERALL BENCHMARK ASSESSMENT RESULTS AND RANK FOR ALL SADC MEMBER STATES

Country	Benchmark Index Score (Adjusted)	Overall Benchmark Ranking
South Africa	0.5891	1
Mauritius	0.5839	2
Seychelles	0.5155	3
Global Median	0.5064	
Eswatini	0.4222	4
Tanzania	0.4138	5
Botswana	0.4114	6
Zimbabwe	0.3895	7
Namibia	0.3809	8
Lesotho	0.3802	9
African Median	0.3595	
Zambia	0.3506	10
Malawi	0.3483	11
Madagascar	0.3005	12
Angola	0.2985	13
Mozambique	0.2919	14
DR Congo	0.2782	15
Comoros	0.2497	16

BENCHMARK ASSESSMENT: DR CONGO

In the benchmark assessment the DR Congo ranked 15 out of the 16 SADC member states. Figure 6 below illustrates the results of the benchmark in comparison to the global and African medians. DR Congo is only ahead of the African median and on par with the Global median in the G5 Digital Economy Benchmark. In the other three assessment areas it lags most of the SADC member states. The benchmark suggests that the DR Congo may be lacking in some key foundational areas necessary for a robust enabling environment for digital development.

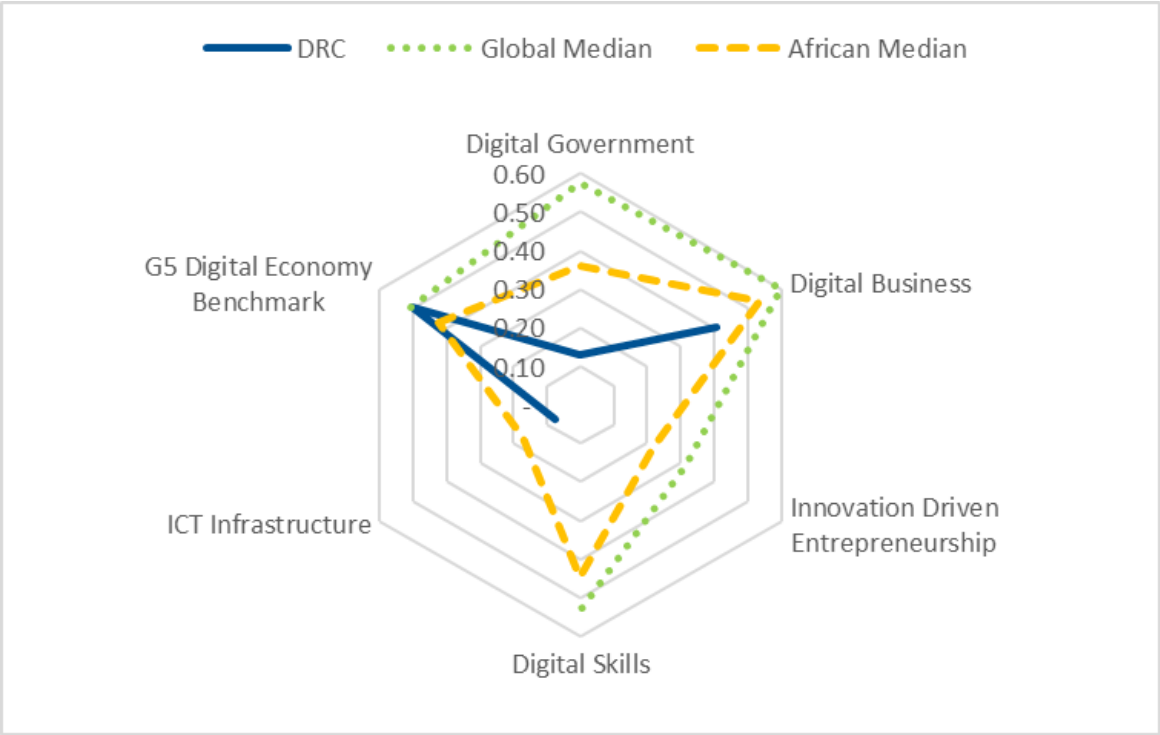

FIGURE 6 RESULTS FROM BENCHMARK ASSESSMENT FOR DR CONGO

Table 5 below, illustrates the ranking for each individual pillar where it predominantly ranked in the lower half of countries for all pillars where data was available.

TABLE 5 RANKING OF ALL SADC MEMBER STATES PER BENCHMARK ASSESSMENT PILLAR

Rank	Digital Government	Digital Business	Innovation Driven Entrepreneurship	Digital Skills	ICT Infrastructure	G5 Digital Economy Benchmark
1	South Africa	Mauritius	Mauritius	Seychelles	South Africa	South Africa
2	Mauritius	South Africa	South Africa	Mauritius	Mauritius	Mauritius
3	Seychelles	Seychelles	Tanzania	Zimbabwe	Seychelles	Botswana
4	Tanzania	Zambia	Namibia	Tanzania	Botswana	Malawi
5	Namibia	Botswana	Botswana	Botswana	Namibia	Eswatini
6	Zimbabwe	Tanzania	Malawi	Namibia	Zimbabwe	DR Congo
7	Mozambique	Madagascar	Madagascar	Zambia	Eswatini	Tanzania
8	Angola	Namibia	Zimbabwe	Lesotho	Zambia	Zambia
9	Eswatini	Eswatini	Zambia	Eswatini	Lesotho	Lesotho
10	Malawi	Lesotho	Mozambique	South Africa	Tanzania	Zimbabwe
11	Botswana	Malawi	Angola	Madagascar	Mozambique	Angola
12	Lesotho	Mozambique		Malawi	Angola	Madagascar
13	Madagascar	Zimbabwe		Mozambique	Comoros	Namibia
14	Zambia	DR Congo		Angola	Malawi	Comoros
15	DR Congo	Angola			DR Congo	Mozambique
16	Comoros				Madagascar	Seychelles

DIGITAL INFRASTRUCTURE

DR Congo ranked 15 out of 16 in the ICT Infrastructure pillar, a key foundational element required for a digital economy. It suggests that there is poor network infrastructure available and according to the UN, only 8.6% of the total population is using the internet.[9] This is much lower than the regional average of 29.94%. The GSMA Mobile Connectivity Index shows a 53% access to the 3G network,[10] which complements the HDI report of mobile cellular subscriptions at 43.4 per 100 people.[11] The DR Congo also ranks as 118th on the Inclusive

Internet Index[12] which details the accessibility, affordability, and relevancy of internet in 120 countries. However, according to the Mobile Connectivity Index,[13] the DR Congo is ranked number 14 in terms of overall mobile connectivity in the SADC countries with an overall index of 26.2—which qualifies it as a Discoverer country (< 35). It scores below average for consumer readiness, affordability, availability of infrastructure and content and services.[ii] In terms of ICT adoption, the DR Congo scores position 137 (out of 140). The government is not considered future oriented based on the position 127 (out of 140) and it scores lower on the innovation capability index as number 139 out of 140.[14] There is no information on the DR Congo for the GCI 4.0 Digital Skills Among the Population Index.[15]

[ii] The enablers of mobile internet connectivity that inform the indicators: 1. Infrastructure, 2. Affordability, 3. Consumer readiness and 4. Content and Services.

2 THE BROADER POLICY ENVIRONMENT

In the benchmark assessment DR Congo ranked 15 out of 16 in the region, lagging in all indicators except the G5 benchmark. The low scores and ranking in the assessment pillars indicate that DR Congo is lacking in some foundational requirements for a digital economy and that there is likely a poor enabling environment for a digital economy. In the *Situational Analysis Report* the clusters of SADC countries identified from the benchmark are discussed in more detail but DR Congo forms part of Group 4 which is made up of countries that scored poorly in the benchmark, are generally more reliant on agriculture for GDP growth and employment and are non-English speaking member states.

The purpose of this section is as follows:

- Take stock of available public policies, strategies, and legislation to understand their scale and scope and assess whether digitalization has been generally embraced by Governments.
- Understand the degree to which these policies provide an enabling environment for a digital economy that includes the agriculture sector.

It is important to recognize that the presence of policy, regulatory or legal frameworks may not always translate into awareness, effectiveness, or enforcement of these frameworks. Policies provide one part of the wider ecosystem needed for enabling innovations. The ability of an innovation to demonstrate value and a viable business model underpinning their innovation, progress towards investment readiness, sustainability and the level of scale that is achievable is likely to play a more important role in enabling innovations rather than policy frameworks[16]. Concurrently, a lack of policies or legislation does not inhibit the creation of digital innovations and technologies. The OECD highlights the common pacing problem, whereby digital technologies and innovations are advancing much faster than regulations and policies[17]. The inherent risks of rushing policies and regulations into effect must be weighed up against the benefits, as getting the pacing wrong could ultimately lead to greater barriers to innovation and risks creating regulations that could be outdated[18].

2.1 GENERAL DIGITAL POLICIES

The benchmark assessment suggested that the DR Congo's digital economy is one of the weakest in the region however, there is some promising prioritization of digital transformation in some key documents. The DR Congo has a very limited number of public general policies and legislation relating to technology and digitalization.

The **Information Technology and Communication Sector Notebook 2017** is a document aimed at attracting investors to the ICT sector in the DR Congo and provides an overview of the sector's legal and regulatory frameworks (see section 2.2). It also presents a detailed overview of the stakeholders and market players, including mobile network operators. The document also refers to a **Sectoral Policy Document (SPD)**[iii] which provides an overall vision for the DR Congo: to bring the country fully into a digital economy. To achieve the vision infrastructure needs investment, sector governance needs improvement, and citizens and businesses need increased and improved access to ICTs. There are ambitious goals included. For example, by 2050 more

[iii] This document was not available for review, so the information related to this document has come from the Information Technology and Communications Sector Notebook.

than 50% of households will use optical fiber cables and more than 90% will be connected to the internet through their mobile phones. Part of the vision and goal is to develop the "robotics market" and digital technology so that the DR Congo can become an important market for phones, software, video games and 3D technology. These plans will be achieved through six objectives illustrated in the figure below that make up the strategy to promote a digital economy and enable the DR Congo to benefit from the digital economy.

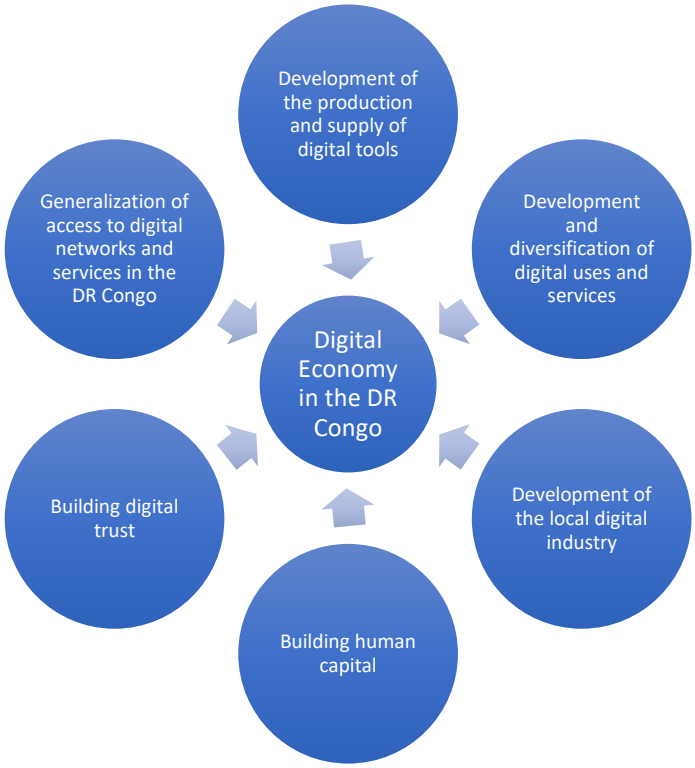

FIGURE 7 SIX PRIORITY AREAS TO IMPLEMENT THE DR CONGO SECTORAL STRATEGY

Some further strategies included in the Sector Notebook are provided to help achieve the improvement of the ICT Sector and achieve a digital economy:

- Adapt and complete the legal and regulatory framework of the sector to promote fair competition for the benefit of users
- Improve efficiency in regulations, specifically in the areas of access and interconnection regulation and radio frequency management
- Streamline and clarify the taxation of the telecommunications sector
- Develop an implementation plan for universal access and create a national broadband network
- Attract more investment by updating regulations and legal frameworks
- Computerize all government services
- Support and encourage business and the public to increase their usage of ICTs

It is unclear where the Sector Notebook fits into the wider plans of the ICT sector. It was produced by the National Agency for Investment Promotion (ANAPI) and goes into more detail on attracting investment and a heavy focus on the regulatory environment. The SPD and the Sector Notebook provide an insight to the appetite of prioritizing a digital transformation within the DR Congo.

The **Horizon 2025** (National Digital Plan) is a national program that provides a digital plan for the DR Congo. The National Digital Plan is based around four strategic pillars:

- Infrastructure: includes incentives to increase access and secure data centers
- Content: includes leveraging Big Data and open data, and stimulating local digital industry
- Applications: include e-Government, norms and standards and a digital culture
- Governance: includes data protection, cybersecurity, and the legal and regulatory framework

The National Digital Plan has a particular focus on the development and modernization of infrastructure, extending coverage and access, securing access to digital content, improving human capital, producing local content, exploiting financial technology platforms, and promoting the Digital Age through public policies. While the structure of the Digital Plan has similar priorities to the benchmark assessment and the Kenyan Blueprint pillars, Digital Business seems omitted. The Plan is forward thinking and includes emerging technologies, including the acknowledgement of Big Data, cyber security and data protections.

2.2 LEGISLATION

The DR Congo have a very small number of outdated legislation that govern the telecommunications sector:

- **Framework Law 013/2002 of 2002** (Loi-Cadre 013/2002 du 16 Octobre 2002 sur les Telecommunications en Republique Democratique du Congo)
    - Establishes the structure of the sector and introduce two Governance Bodies:
        - Ministry of Telecommunications
        - Regulatory Body
- **Framework Law 014/2002 of 2002** (Loi 014/2002 du 16 Octobre 2002 portant creation de l'autorite de regulation de la poste et des telecommunications)
    - Establishes an independent regulator: the Congolese Post and Telecommunications Authority (ARPTC) which mandates compliance with laws, regulations and conventions of the sector and manages control of frequency spectrum.

A new Telecoms Framework Law is under development, but no reference was made to it on the official Government website, and it seems that it has taken two years for it to be promulgated; it has still not been published[19]. There is no publicly available evidence of regulation or legislation that protects consumers from electronic transactions or recognizes electronic signatures. The legislation in place currently refers mainly to telecommunications and not ICTs or emerging digital technologies. The DR Congo is in urgent need of updated legislation to go alongside the Digital Plan, particularly around data protection and cybersecurity, if the intention is to encourage the use of data in public services and innovations.

2.3 DIGITALIZATION IN AGRICULTURE

DIGITAL IN AGRICULTURE POLICIES

The study team reviewed the **Agricultural Policy 2009**, the **National Agricultural Investment Plan (2014-2020)** and the **Investing in the Agricultural Sector** document to determine if any digitalization has been embraced in policies or strategies. There was no evidence of any inclusion of ICTs or digital technologies in any of these documents. It is possible that there are strategies or policies in development that may have been impacted by delays in the Covid-19 pandemic, especially as the Investment Plan only went up to 2020. However, when looking through the **National Strategic Development Plan 2019-2030** (NSDP) and the **Horizon 2030** the prioritization of the agriculture sector is evident. In the NSDP there is no specific reference

to digitalization in agriculture, but an objective to strengthen the contribution of agriculture to economic growth and job creation is presented in Horizon 2030. What will be required in the future is a robust and clear strategy on the agricultural sector with the inclusion of digital technologies similar to the National Digital Plan.

CHALLENGES

The DR Congo has an under-developed policy and regulatory environment for ICTs. There is one guiding Digital Plan that is detailed above and has clear and ambitious initiatives, but it does not prioritize agriculture within the plan, despite it being a priority sector in the National Strategic Development Plan. The legal environment is also lagging with outdated laws that likely do not reflect the technologies in use. There are no specific data or security policies or regulations and there does not seem to be any regulations around electronic transactions and commerce.

An agricultural digital strategy would help to guide the direction of the sector but would also require foundational elements of a digital economy to address challenges that are currently being faced in the field. Coverage of networks is inconsistent and low, particularly in rural areas, and remains a barrier to greater adoption of technologies in the sector. Cost-effective solutions to inconsistent flows of electricity should be further investigated. Beyond access, it is likely that digital literacy is another barrier as it has featured frequently in all strategies and plans of the DR Congo.

3 DIGITAL AGRICULTURAL INNOVATIONS

This chapter provides a stock taking analysis to assess the numbers, scope, trends, and characteristics of digital agricultural innovations in the DR Congo.

3.1 MAPPING DIGITAL AGRICULTURAL INNOVATIONS

The DACS for the DR Congo presents use cases according to a typology and framework developed by GSMA (See Figure 2). The broad areas include access to services, access to markets and access to asset classes. The diagram below represents the type of GSMA use cases found in the identified innovations in the DR Congo. A total of eight innovations were identified that had a mix of use cases as illustrated in Figure 8 below. Of those identified, four were operational only in the DR Congo and the other four operated regionally.

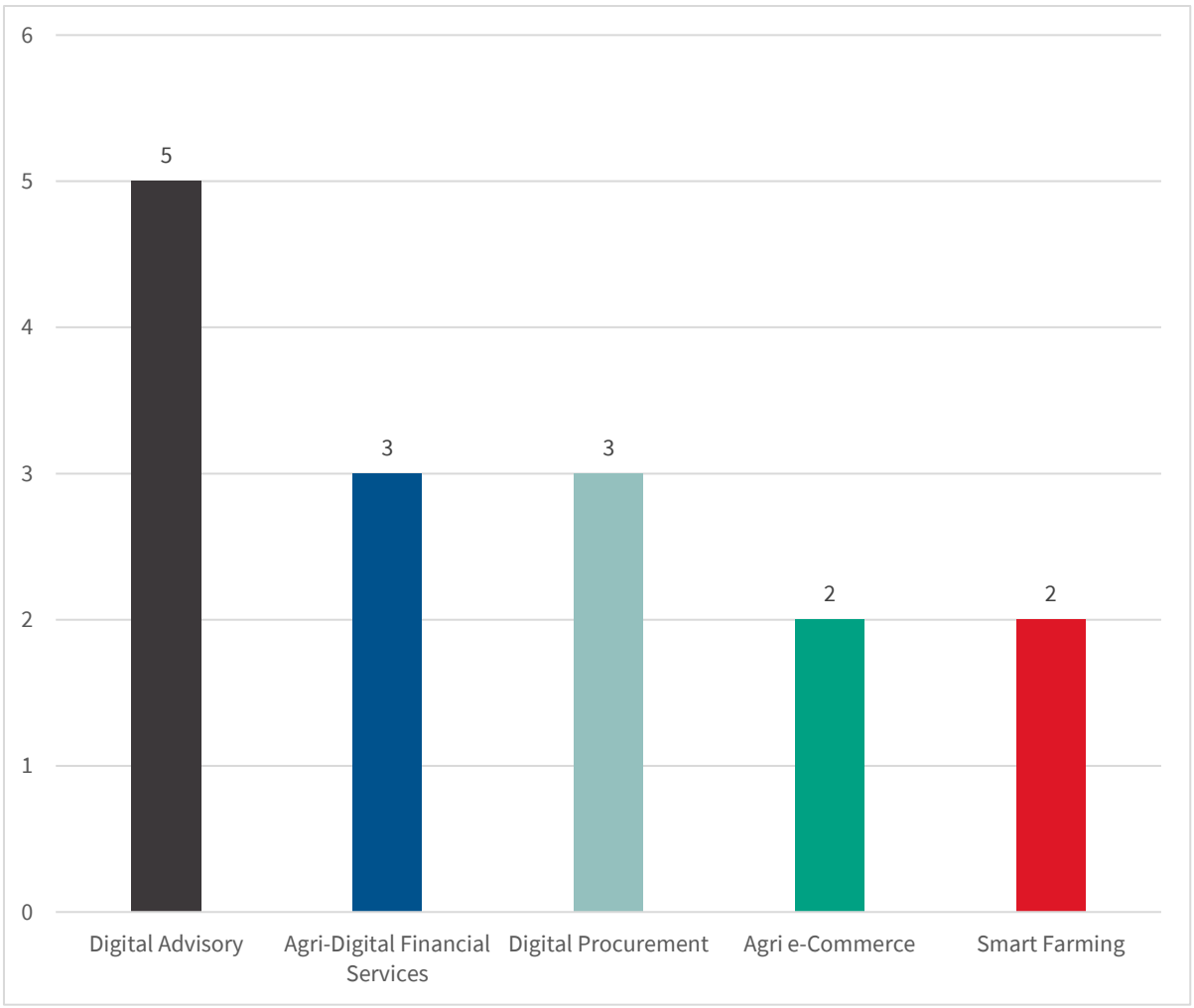

FIGURE 8 IDENTIFIED USE CASES FROM INNOVATIONS IN THE DR CONGO

The table below presents an overview of all identified innovations with their use cases, a brief description of the innovation and company, and where the innovation is operational in the SADC member states.

3.2 IDENTIFIED AGRICULTURAL INNOVATIONS IN THE DR CONGO

In the first four columns the following color coding is used for the different use-cases:

DIGITAL ADVISORY | AGRI-DIGITAL FINANCIAL SERVICES | DIGITAL PROCUREMENT | AGRI E-COMMERCE | SMART FARMING

TABLE 6 OVERVIEW OF IDENTIFIED AGRICULTURAL INNOVATIONS OPERATIONAL IN THE DR CONGO

					Name of innovation	Name of the company	Survey ✓/X	Description of innovation	Operational Countries in SADC
	■				Agrofund	Agrofund	X	Agrofund of Agrofund. Agrofund is the first participatory financing platform in the Democratic Republic of Congo. Its mission is to help small farmers who are struggling to find financing from banks to either start or grow their business.	Democratic Republic of Congo
■				■	FAMEWS	FAO	X	FAMEWS of FAO. The FAW Monitoring and Early Warning System (FAMEWS) is a free mobile application for Android cell phones from the Food and Agriculture Organization of the United Nations (FAO) for the real-time global monitoring of the Fall Armyworm (FAW). This multi-lingual tool allows farmers, communities, extension agents and others to record standardized field data whenever they scout a field or check pheromone traps for FAW.	Democratic Republic of Congo
■		■		■	GeoFarmer	GEOTERRAIMAGE (Pty) LTD	✓	GeoFarmer at GEOTERRAIMAGE Ltd is established in 2017 and has combined innovations in smart farming and digital advisory and e-commerce and are regional in their deployment across the entire SADC region. Whilst GeoTerraImage is a private sector company which provides actionable intelligence through monthly crop monitoring through GeoFARMER-©-Crop monitoring platform to support precision farming and accurate information to map crop trends and statistics by using a dashboard in a cloud-based environment. Through the use of computers, satellites and Earth Observation the innovative solution provides visual maps and illustrations, statistics and trends for each field or farm being analyzed (crop type, crop growth stages, land suitability, crop irrigation) and guiding decision making around farm management and practices for more efficient and sustainable production. GeoTerraImage have reached wide scale sustained adoption and operate in Angola,	Angola, Botswana, Comoros, Democratic Republic of Congo, Eswatini, Lesotho, Madagascar, Malawi, Mauritius,

								Botswana, Comoros, DR Congo, Eswatini, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Tanzania, Zambia, and Zimbabwe. Through specialized software, proprietary algorithms, and application GeoTerraImage use remote sensed data to create spatial information. They combine advanced information and reporting to enable analysis, quantification, and monitoring to support key decision making. They charge business subscription fees for their fully commercial product and believe their technology is inclusive of underrepresented groups.	Mozambique, Namibia, Seychelles, South Africa, Tanzania, Zambia, Zimbabwe
					Metajua	Metajua	X	Metajua of Metajua. This innovation provides a modular solution with the aim of covering all data flow needs for organizations buying agriculture products from and interacting with smallholder farmers.	Democratic Republic of Congo, Madagascar, Tanzania
					MukulimaSoko	MukulimaSoko	✓	This is an innovation from 2018 and is a digital agricultural trading center that offers several advantages to the players in the sector including: Soko: E-commerce through the grouping of agricultural products for common sale through virtual and physical agricultural relay warehouses in the production environment. Their business model is via a small transaction fee in the market platform.	Democratic Republic of Congo
					Mukuru App	Mukuru Africa	✓	Mukuru Money Transfer Limited is a private sector company operating regionally (Botswana, DR Congo, Eswatini, Lesotho, Malawi, Mauritius, Mozambique, South Africa, Tanzania, and Zimbabwe). The application addresses a knowledge and access gap and provides access to markets and financial services. The Mukuru App was launched in 2019 and allows customers to create orders for remittances individually and initiate a payment for the transfer to happen. The app can also be used to self-register a customer on the platform and verification takes 24 hours. This enables efficient access to financial services through smartphones. The innovation uses SMS, USSD, a Smartphone App, Website, Dashboard, Social Media Platform and (Fb, Twitter, WhatsApp, Messenger). The platform uses local and cloud-based databases (Excel, MS Access, SQL) and AI platforms (IBM Watson) for Machine learning. Regionally it has 500,000 users and 1M registered users. Also enables farmers to sell to consumers (B2C) and to enterprise	Botswana, Democratic Republic of Congo, Eswatini, Lesotho, Malawi, Mauritius, Mozambique, South Africa, Tanzania, Zimbabwe

								customers (B2B) such as hotels, restaurants, and market retailers. Challenges include digital literacy, device sharing, lack of mobile coverage and financial sustainability of the business model in different locations. The application has reached sustainable scale and is focused on individual users. The business was supported by friends and family and development support and training grants. The revenue model is based on transaction fees and the in-house development of the App and platform which is believed to be inclusive of disadvantaged groups.	
■					Online seed verification system	Common Market for Eastern and Southern Africa (COMESA)	X	Online seed verification system from COMESA. COMESA has become the first regional trading bloc to launch an online seed label verification system in Africa and globally. The system will assist the region eliminate cases of fake seed and boost trade in quality and improved certified seed.	Democratic Republic of Congo
■					Viamo platform	Viamo	✓	Viamo 321 Platform from Viamo. The Viamo platform is implemented in Democratic Republic of Congo, Madagascar, Malawi, Mozambique, Tanzania, Zambia. Viamo is a global Mobile for Development (M4D) organization that aims to improve lives via the power of mobile technology. With a presence in more than 20 major markets in Africa and Asia, Viamo is a global social enterprise that specializes in mobile engagement and Information and Communication Technology for Development. Viamo works in partnership with organizations to connect them and individuals through digital technology, for everyone to make better decisions. Viamo uses IVR technology for Agri-VAS for information dissemination and data collection. It also helps provide market linkages between farmers and consumers. It assists farmers with climate smart information hosted on a hotline that farmers can access on-demand and provides market price information. Agri VAS are delivered via voice channels (IVR, helplines), text channels (SMS and USSD) and via apps. Launched in 2017 it has 300,000 smartphone users and 8.5M registered users in the SADC region. The challenges they face, relate to understanding the market and user needs, device sharing, uptake by farmers especially women and girls, lack of mobile coverage, electricity. They have reached sustainable scale and charge commercial rates as a social enterprise. Development partners can use the platform for a fee to develop content and disseminate this to the subscribers of the platform.	Democratic Republic of Congo, Madagascar, Malawi, Mozambique, Tanzania, Zambia

3.3 RESULTS FROM INNOVATION SURVEY RESPONDENTS

All identified innovators received a survey and four innovations implemented in the DR Congo responded. The survey provided self-reported information. All identified innovators were reminded several times by email and by phone to complete the survey. The response rate of the survey for the DR Congo was 50% (four of the eight identified innovations responded).

USE CASES AND SUB USE CASES

The division of GSMA use cases shows that in the DR Congo multiple use cases are most common. Three out of four respondents provided multiple services (all providing three use cases) and only one respondent provided a single use case (Viamo Platform).

Figure 9 below provides the division of use cases surveyed. Digital advisory was the most common use case cited by three survey respondents. Agri-Digital Financial Services, Digital Procurement and Agri E-Commerce were all mentioned twice, respectively. Smart Farming was mentioned once by an innovation operating regionally. Figure 9 also illustrates a comparison of use cases to the rest of the identified innovations in the SADC region, the DR Congo broadly follows the same trend, but had more financial services than regionally identified.

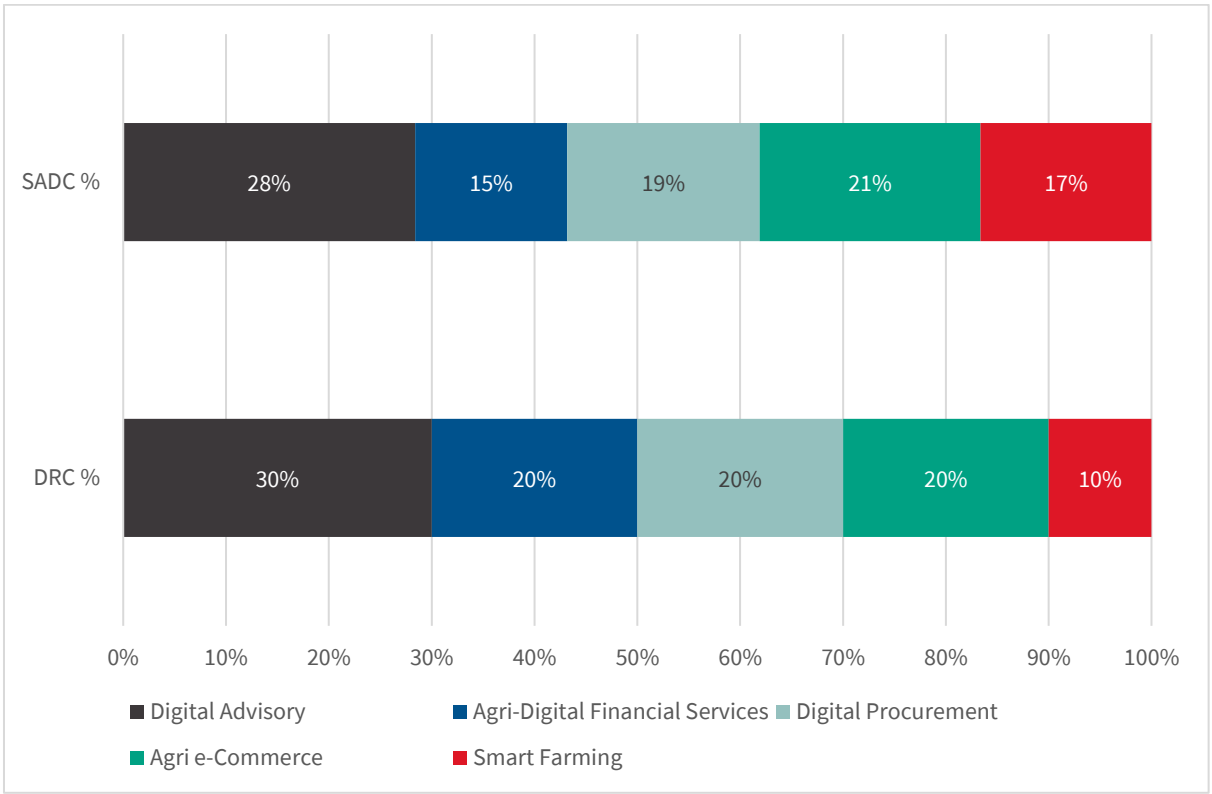

FIGURE 9 DIVISION OF USE CASES FOR SURVEY RESPONDENTS IN DR CONGO VS. IDENTIFIED INNOVATIONS IN SADC

The innovations present in the DR Congo provide a limited spread of sub-use cases as presented in figure 10 below. Under Digital Advisory, smart advisory was the most common, but Agri Vas and pest and disease information also featured. For Agri E-Commerce, only Outputs feature in the DR Congo. Under Agri-Digital Financial Services, the sub use cases included crowdfunding and digital agri wallets.

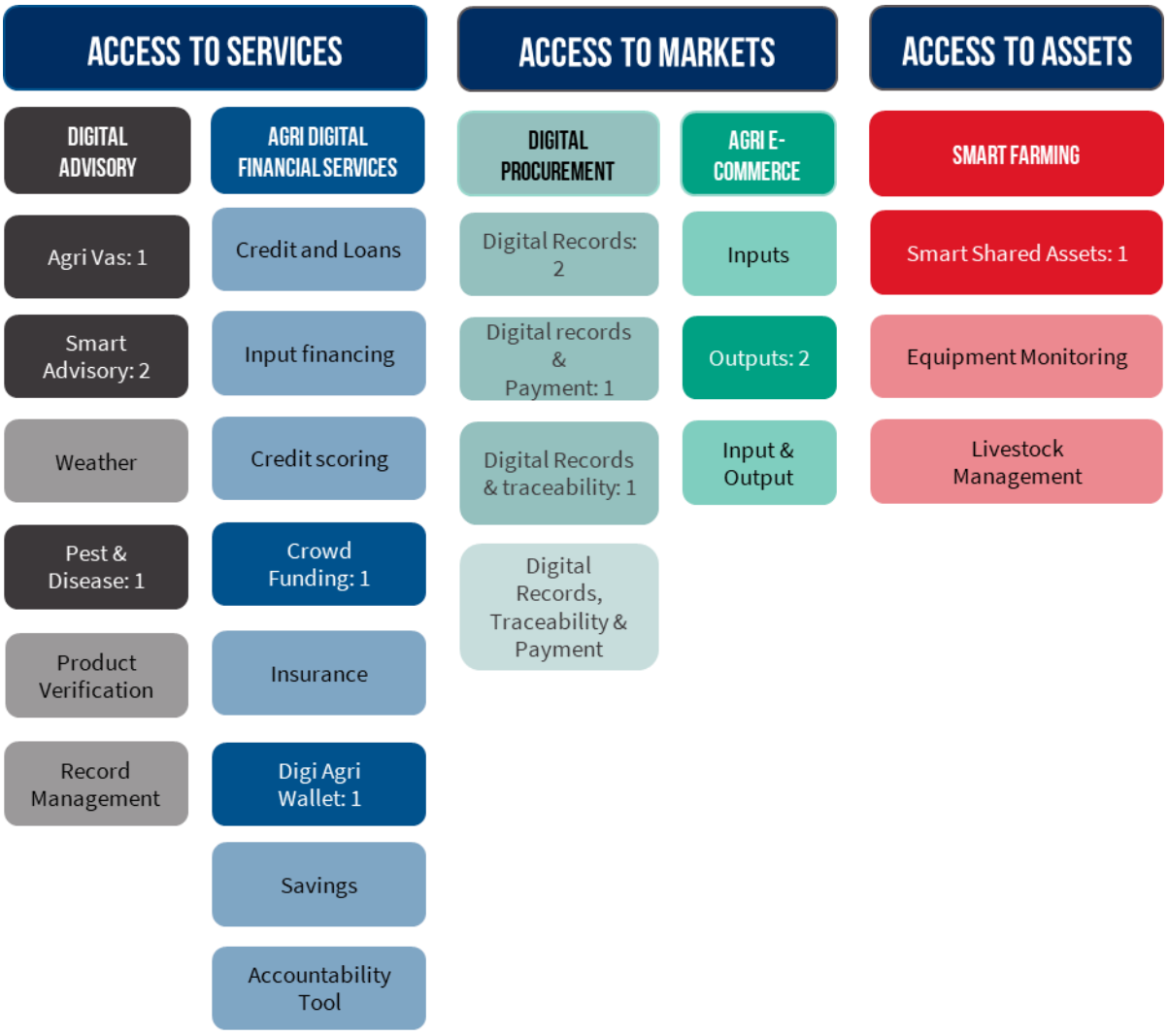

FIGURE 10 OVERVIEW OF SUB USE CASES PRESENT IN SURVEYED INNOVATIONS IN THE DR CONGO

The innovations targeted a wide range of anticipated outcomes: actionable intelligence for farmers, improved efficiency, access to finance, reduced post-harvest loss, improved yields, increased income, and networking were all mentioned once. But due to the small number of respondents this is not a complete picture.

CHALLENGES

In the DR Congo, all the pain points are being addressed by innovations but the most common amongst those surveyed was the knowledge gap and poor access to markets which were mentioned by all four respondents. Low productivity was the next most common pain point being addressed (3). For the innovations operating only in the DR Congo, the knowledge gap, financial exclusion, and poor access to markets were the issues they were trying to address.

In terms of the challenges that the innovators faced in applying or implementing their technologies, the most common cited by all but one respondent is the lack of mobile network coverage. Digital literacy, farmer uptake and use, and access to devices were all mentioned twice, respectively.

TECHNOLOGY USE AND CHANNELS

Computers were the number one device used for innovations (mentioned twice), followed by basic feature phones, smartphones and satellites which were all mentioned once. In terms of types of digital channels used by innovators, websites were mentioned most (3). Mobile voice, SMS, USSD, smartphone apps, video, social media, messaging platforms and geo data were all mentioned once. For analysis tools and technologies, all respondents mentioned cloud-based databases, followed by spreadsheets (3). Other tools such as cloud-based software, Artificial Intelligence and Machine Learning were all mentioned twice but by regional innovations.

VALUE CHAIN PHASES COVERED

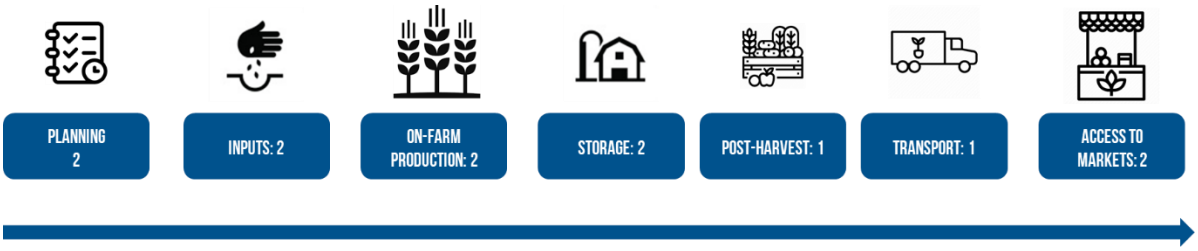

FIGURE 11 SURVEYED INNOVATIONS PRESENCE IN THE VALUE CHAIN IN DR CONGO

Surveyed innovations in the DR Congo addressed all stages of the value chain but are more are tailored for the earlier stages of the value chain in terms of planning, inputs, on-farm production, storage and the final stage access to markets. Figure 11 illustrates the different phases of the agricultural value chain that the innovations in the DR Congo address. These results may not provide a fully accurate picture of the DR Congo due to the low number of respondents.

SCALING

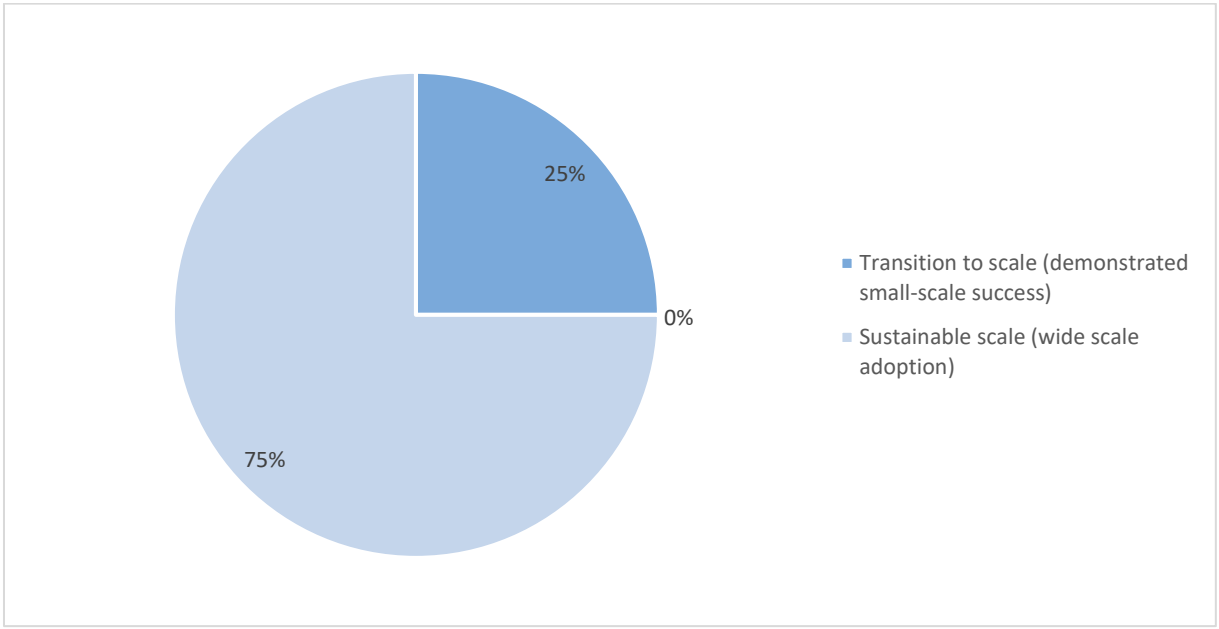

FIGURE 12 SCALING STAGES FROM SURVEYED INNOVATIONS IN DR CONGO

Most digital innovations (3) in the DR Congo are regional innovations and have reached sustainable scale, based on the Insights on Scaling Innovation report[20]. However, one of the survey respondents cited small scale

success. The only innovation, which was developed in the DR Congo is at the transition to scale phase (MukulimaSoko). They have reached 4,700 registered users. Their business model is based on transaction fees, but they also aim to receive donor grants and challenge prizes for further growth or expanding new product lines.

INCLUSIVITY AND TARGET AUDIENCES

Most innovations target farmers (3), followed by government agencies, NGO staff and other value chain actors (2). Extension workers were targeted as intermediary users by two respondents. All the innovations are targeted at business level (4) and the government, community, and household level follow (mentioned three times respectively).

All survey respondents have either taken explicit action to be more inclusive or already believe their technology to be inclusive of certain groups. Two innovations made explicit action to be more inclusive of women and smallholder farmers. Three innovations already believe they are inclusive for people with disabilities and the elderly. One innovation had also taken explicit action to be more inclusive of individuals with limited or low literacy levels. Only one innovation cited that they may not be fully inclusive for people with disabilities.

DEVELOPMENT, FUNDING AND REVENUE SCHEMES

Two of the four survey respondents mentioned that they had received support in the form of training, incubation support or network opportunities. Two organizations used transaction fees as their revenue model, while one is targeting business subscriptions and one premium services. Two claim to need no additional donor support and two mentioned they do need subsidy or donor grants. During the development phase innovators worked together with commercial agricultural enterprises (2), while during implementation most with community organizations (2).

All the innovations surveyed were developed by private sector companies and launched between 2017-2019. However, when asked which actors were significantly involved in developing the innovation there was a range of responses including **commercial agriculture companies** (2), **community organizations**, local government agencies, national government agencies, **international donor programs** and research institutes were all mentioned once. Those in bold were mentioned by innovations operational in the DR Congo only. The actors don't change significantly when asked who is involved in the implementation, however community organizations are mentioned most (2).

In terms of financing, three respondents mentioned receiving support from training, two respondents mentioned incubation support and network opportunities (2, respectively). For sources of revenue, two respondents mentioned transaction fees, but business subscription fees and premium service fees were also mentioned once. There was a split in the responses when asked whether a subsidy or donor support was required with two regional innovations replying no and two replying yes (one respondent was operational in the DR Congo only).

4 DIGITAL AGRICULTURAL SYLLABI AND ENTREPRENEURSHIP TRAINING

The two general objectives of the human capital and leadership component of the DR Congo National Strategic Digital Plan for 2025 seek to strengthen digital capacities, combat against digital illiteracy and to respond by implementing professional qualifications and certifications as demanded by the digital market. This means the political will to support digital skills is present. The achievement of these objectives is based on the following actions and initiatives:

- Include digital technology in the national education system and create education, study, and research streams for digital development in schools, vocational training centers, and universities.
- Set up community hubs for Internet access and other digital uses for wide access to the public.
- Set up meeting spaces, discussion frameworks and digital skills transfer workshops, paying particular attention to elderly people and those living with disabilities.
- Train trainers as well as public administration officials in the use of IT tools.
- Promote start-ups with related funds and stimulate and reward innovation through skills competitions within schools, universities, citizens, administrators, and professionals.

In May 2019, Eb@le, the National Research and Education Network (NREN) of the DR Congo became the 11th NREN to be connected to the UbuntuNet Network, the data communications network of UbuntuNet Alliance, which interconnects NRENs in Southern and Eastern Africa, and to the internet in Europe. In 2020 the Network Readiness Index[21] rated DR Congo last in the technology pillar. The technology pillar considers a country's access to technological infrastructure, content, usage, and the vision for future technologies. This rating provides an indication that DR Congo requires immense and immediate support to prepare for a digital agricultural future.

4.1 AGRICULTURAL SYLLABI UNIVERSITIES

The study team invited five Agricultural Universities to respond to the survey:

- Université Catholique De Bukavu
- Université Evangelique en Afrique
- Université Pédagogique Nationale
- Universite de Kisangani
- Université Officielle de Bukavu

The Université Evangelique en Afrique and the Université Pédagogique Nationale were the only respondents to the survey and KIIs.

UNIVERSITE EVANGELIQUE EN AFRIQUE (FACULTY OF AGRICULTURAL AND ENVIRONMENTAL SCIENCES)

The Université Evangelique en Afrique implemented its first digital training in 2005 and all their digital trainings are only taught onsite. Regarding the levels of these digital trainings, two of them are delivered at certificate level, eight at B.Sc. level and seven at M.Sc. level. In the area of digital agriculture, the University teaches Big Data for analytics in agriculture, Internet of Things (IoT) for Agriculture and Programming / Coding for agricultural systems at certificate level. Students are skilled to work for the public and private sector or in

advanced research. The university doesn't teach digital entrepreneurship trainings but considers that skilling youth in Data Collection, Agri Digital Financial services, Digital Procurement and Smart Farming will facilitate their absorption into DR Congo's agricultural labor market sector. Experimental Farms are considered the most important facility for digital training by the Université Evangelique en Afrique.

UNIVERSITÉ PÉDAGOGIQUE NATIONALE (AGRONOMICS SCIENCES)

The University has offered various online and onsite digital trainings since 2019. Regarding the levels of these digital trainings, three of them are at College incubator, one at B.Sc. level, four at M.Sc. level, eight at PhD level and nine of them at the University incubator level. In the area of digital agriculture, the University teaches Big Data for analytics in agriculture, IoT for Agriculture, Programming / Coding for agricultural systems, Digital entrepreneurship in agriculture, Cyber security in the agricultural context and Virtual Reality for agriculture onsite and online at M.Sc. level. They did not provide information on whether they teach entrepreneurship trainings. Entrepreneurship skills and facilities are important in enabling the inclusion of youth into DR Congo's agricultural labor market.

TABLE 7 OVERVIEW OF RESPONSES FROM SURVEYED UNIVERSITIES IN THE DR CONGO

DR CONGO UNIVERSITIES	
Universite Evangelique en Afrique - Faculty of Agricultural and Environmental Sciences	
Digital Agri Skills	Big Data for analytics in agriculture Internet of Things for agriculture Programming / Coding for agricultural systems
Digital training courses updated	Yes
Digital entrepreneurship trainings	None
Type of Skills building	Finding a job as an employee Working in advancing research (PhD, research institutions, others, etc.)
Most important digital Agri skills	Data collection Agri Digital Financial Services Digital Procurement Smart Farming
Most important facility for digital trainings	Experimental Farms
Aligned with institutional strategy	No
Université Pédagogique Nationale - Agronomics sciences	
Digital Agri Skills	Big Data for analytics in agriculture Internet of Things for agriculture Programming / Coding for agricultural systems Digital entrepreneurship in agriculture Cyber security in the agricultural context Virtual Reality for agriculture
Digital training courses updated	No
Digital entrepreneurship trainings	N/A
Type of Skills building	N/A
Most important digital Agri skills	N/A
Most important facility for digital trainings	N/A
Aligned with institutional strategy	Yes

4.2 INCUBATORS AND INNOVATION HUBS

A total of eighteen business support organizations were mapped in the country, of which seven are operating in the agricultural sector. The general business support organizations with any focus or activity in the agricultural sector that were identified are Kinshasa Hub, Kivu Hub, Konnect SAS, Congo Hub Startup, Joks entrepreneuriat, Kin Start-up Academy, Fédération Nationale des Jeunes Entrepreneurs du Congo, Réseau Solidaire des Jeunes Entrepreneurs du Congo, Kinshasa Digital Academy, Muungano Hub and Lisungi Fablab. For these organizations no evidence of trainings and incubation activities dedicated to agriculture entrepreneurs was apparent. Therefore, they were not targeted for interviews.

The agriculture-related business support organizations that were identified and invited for interviews are:

- Kobo Hub
- Université Catholique de Bukavu (UCB) Agribusiness Incubation Center
- Projet d'Entreprenariat des Jeunes dans l'Agriculture et l'Agro-Business (PEJAB)
- Kivu Entrepreneurs
- Ingenious City
- Orange Corners RDC Lumumba Lab

Two business support organizations responded to our request and took part in KIIs.

KOBO HUB

Kobo Hub is a business accelerator established in 2018 aimed at accelerating the emergence and success of local entrepreneurs with projects that enhance local skills. Kobo Hub regularly organizes a networking event called the "entrepreneurial aperitif" where entrepreneurs can meet experts and potential partners. Through Kobo Academy, Kobo Hub offers digital marketing training and collaborates with an agricultural company for agricultural training. Kobo Pay, a payment platform that will be launched soon for mobile money through POS and accessible via www.koboopay.com, will be used and taught to the incubatees. The digital trainings that they offer to graduates and young entrepreneurs include website development, digital marketing, FinTech and IT tools to manage the business. They currently don't teach digital agriculture trainings and they don't collaborate with colleges and universities.

UNIVERSITÉ CATHOLIQUE DE BUKAVU - BUKAVU AGRIBUSINESS INCUBATION CENTER

Hosted by the Catholic University of Bukavu, Bukavu Agribusiness Incubation Center was established in 2018 and is a business accelerator and incubator. The university facilitates access to and use of the land by the young agripreneurs (1-2 acres) and hosts trainings. Bukavu Agribusiness Incubation center collaborate with KivuTech to provide coworking spaces to Bukavu Agribusiness Incubation center's incubatees (for 1-2 months). To date, they have supported a total of thirty agri startups and funded ten of them including AgroVi (processing groundnuts and other local products), Wibe enterprises (chicken production), Provand enterprises (processing animal food), Dalia flowers (production and commercializing of flowers and horticultural products) and EPH (tilapia production on Kivu Lake). Trainings offered focus on business plan management and improvement of new orientations. However, they do not yet provide digital or digital agriculture trainings. They are discussing with KivuTech for the development of curricula on digital trainings. The center regularly receives students from the UCB, the Université Evangelique en Afrique and the Institut Supérieur de Développement Rural for the incubation program.

TABLE 8 OVERVIEW OF RESPONSES FROM INTERVIEWED INCUBATORS IN THE CONGO

DR CONGO INCUBATORS	
Kobo Hub	
Year of Establishment	2018
Agri start-ups incubated	N/A
Target of Digital Agri trainings	Graduate Young Entrepreneurs
Digital Skills trainings	Website Development Digital Marketing FinTech IT tools to manage the business
Digital Agri Tools taught	None
Collaboration with Universities and Colleges	None
Supported by the Government?	None
Université Catholique de Bukavu - Bukavu Agribusiness Incubation Center	
Year of Establishment	2018
Agri start-ups incubated	30
Target of Digital Agri trainings	None
Digital Skills trainings	None
Digital Agri Tools thoughts	None
Collaboration with Universities and Colleges	UCB Université Evangelique en Afrique Institut Superieure de Développement Rural
Supported by the Government?	No

5 INSIGHTS AND REFLECTIONS

The following section outlines the key insights from the data collection of the DACS and towards the end of the report signposts some broader reflections relevant to this country from the *Situational Analysis Report*.

It is important to note that digitalization is a gradual process, which requires a broad and well understood internal rationale, adjustment of organizational culture and adequate investments over time and of resources to align actors, processes, and capacity. This section acknowledges that the data collected is not exhaustive but has enabled some insights and reflections to be shared that are more country specific. To capitalize on these results multistakeholder processes to define clear approaches based on agreed priorities will be necessary.

5.1 INSIGHTS

BENCHMARK RESULTS

The DR Congo ranked 15 out of 16 in the benchmark assessment which suggests that it may be a gap in some key foundational areas necessary for a robust digital economy and lagging the other SADC member states. The benchmark assessment enabled the identification of countries within SADC that are unlocking positive pathways towards a digital economy and a vibrant ecosystem of different actors. The DR Congo scored poorly in all but the G5 digital economy benchmark which identifies the presence of policies and regulations that are dynamic and flexible and promote the digital economy. This high ranking is at odds with the rest of the foundational pillars in the benchmark and some of the findings from the policy environment section.

Four clusters of countries at different points in their progress were identified in applying the benchmark. The clusters formed through the benchmark help to identify the progress countries have made and where greater efforts may need to be directed. The DR Congo makes up part of Group 4, these countries ranked lower down the benchmark and based on the data collected, appear to be least advanced in the region. However, these countries are in digital transition and could leapfrog the more conventional stages of policy development with the right level of prioritization within government and the public sector.

POLICY ENVIRONMENT

The benchmark assessment suggested that the DR Congo's digital economy is lagging, but the high score in the G5 benchmark suggested that there might be some policies and regulations that can promote an enabling environment for the digital economy. The stock take of national policies, strategies and legislation identified that digitalization is being prioritized somewhat. Three key documents were available for review that focused on ICT dissemination, investment into the sector, and to stimulate development of technologies. The DR Congo does also have a National Digital Plan that presents a clear roadmap of how to attain a digital economy with specific objectives for a range of sectors. This is encouraging and can be used as a guiding document for other departments and ministries to prepare specific sector plans that balance the challenges and risks of greater digital transformation. However, it seems that the DR Congo is still in the preliminary stages of development of a digital economy and the National Digital Plan should serve as a guiding document.

Gaps also exist in legislation with limited protection for consumers online, electronic transactions, data protection or cyber security. The legal environment is also lagging with outdated laws that likely do not reflect

the technologies in use. These frameworks need to be strengthened and harmonized with international standards to attract greater investment in the sector.

No specific sectoral strategy or policy on digitalization within agriculture was identified. Agriculture is frequently noted as a key priority sector in general plans but there is little evidence of an integration of ICTs in agricultural systems in the documents reviewed. An agricultural digital strategy would help to guide the direction of the sector but would require foundational elements of a digital economy to be addressed. The key challenges identified from research, innovation assessment, review and KIIs is the lack of a guiding policy or strategy specific to agriculture, coverage of networks and connectivity, and the level of digital literacy among farmers. Many of these challenges require greater stakeholder collaboration including the private sector and civil society as they fall outside the remit of the Ministry of Agriculture. The last two challenges mentioned were also raised by innovators in Chapter 2.

DIGITAL AGRICULTURE INNOVATIONS

A total of eight innovations were identified in the DR Congo, but only four responded to the survey. All use cases were present in the DR Congo: digital advisory, agri-digital financial services, digital procurement, agri e-commerce and smart farming. Digital advisory was most common and cited in all responses. With the low response rate, it is difficult to accurately ascertain where the gaps in uses cases are, but the survey responses indicate that smart farming is the least prevalent in the DR Congo.

The surveyed innovations addressed all stages of the value chain, but most are tailored for the earlier stages including planning, inputs, on-farm production, and storage. Access to markets was also a common area in the responses. This is reflective of the pain points those innovations are attempting to address, as poor access to markets and the knowledge gap were both cited by all respondents.

All the innovations were developed by private sector companies, but half of the surveyed innovations cited that they would need additional subsidies or donor funding to remain sustainable. This suggests a clear challenge for innovations to reach financial sustainability. However, all the innovations in the DR Congo had reached a mature level of scalability. Policy needs to be implemented to promote entrepreneurship and increased access to capital so that solutions can be developed. However, the sector also needs to prepare and support an environment that will allow for the integration of these innovations such as increasing digital skills, improved connectivity, and farmer uptake so that strategies and policies complement each other and support the overall digital ecosystem.

DIGITAL AGRICULTURAL SYLLABI AND ENTREPRENEURSHIP TRAINING

The DR Congo has different innovation hubs and incubators, but they don't seem to focus on Digital Agricultural Innovations, which explains the low number of innovations for such a large country. DR Congo requires support to implement its digital plan and support to strengthen Eb@le to effectively play its role as an internet services provider for research and educational institutions – especially the rural or remote institutions, including innovation hubs. There is a clear opportunity to strengthen the collaborations among universities, innovation hubs, government, private and public sector players so digital agricultural capacities and entrepreneurship are built in a sustainable manner.

For the incubators interviewed, CCARDESA and other international partners could better support the development of digital skills for agricultural youth entrepreneurship in the SADC region by strengthening the collaboration among universities, research centers, innovation hubs and private sector. Support should also

be provided to lobby governments to support the establishment and maturity of national research and education networks for the provision of internet network infrastructure and value-added services for research centers, innovation hubs, colleges, and universities.

5.2 REFLECTIONS FROM THE SITUATIONAL ANALYSIS REPORT

This document has presented the available data collected for the DR Congo and provides detailed insights on the three main elements: policies, innovations, and digital skills. The country data collected is intended to be useful for a local context, however the *Situational Analysis Report* presents a much broader perspective which examines regional trends, provides analysis on the regional findings, and highlights potential areas for shared learnings across the SADC region.

This section briefly presents key regional reflections that are relevant for this country that are derived from the *Situational Analysis Report.* The intention is to direct the reader to the report where these points have been elaborated on and presented alongside other countries in the region to learn from.

The key reflections from the Situational Analysis Report relevant to the DR Congo include:

- **Government has a role in improving access to the digital communication channels for the population and farmers.** Collaboration across government departments, the private sector and the incubation ecosystem towards the telecom operators (public and/or private) to improve the internet connection and make it available for the innovators (the entrepreneurs) and the users (the farmers and local population) is also required to facilitate the access to these services and promote entrepreneurship.
- **An agriculture sector specific digital strategy and roadmap is necessary with clear objectives, milestones, timelines, and funding requirements to tie in the sector performance with a digital economy advancement.** A clear agriculture sector specific strategy or roadmap can address some of the key challenges raised by stakeholders consulted during this study.
- **Digital Content should be hyper-localized, relevant to local constraints and deployed through channels that facilitate and enable action by farmers.** Content is still perceived to be too academic, difficult to understand and in turn less actionable for farmers to use. Knowledge transfer from academic research to pragmatic farming practices is a complex process. To use digital agriculture innovations, digital skills are critical. Where digital literacy is low, access to and use of digital agricultural innovations is likely to be lower.
- **Greater efforts are necessary to understand whether the legal and regulatory standards in place for digital commerce, privacy and data fulfil their objectives for all stakeholders.** With greater digitalization more focus should be placed on ensuring trust, privacy and protection of consumers and businesses. More directly related to legislation is the regulation and standards that are currently missing to enable greater interoperability between the private sector, public sector and across regional bodies.

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DIGITAL AGRICULTURE COUNTRY STUDY ANNEX TO THE SITUATIONAL ANALYSIS REPORT OF THE SADC REGION

Centre for Coordination of Agricultural Research and Development for Southern Africa

World Bank Group