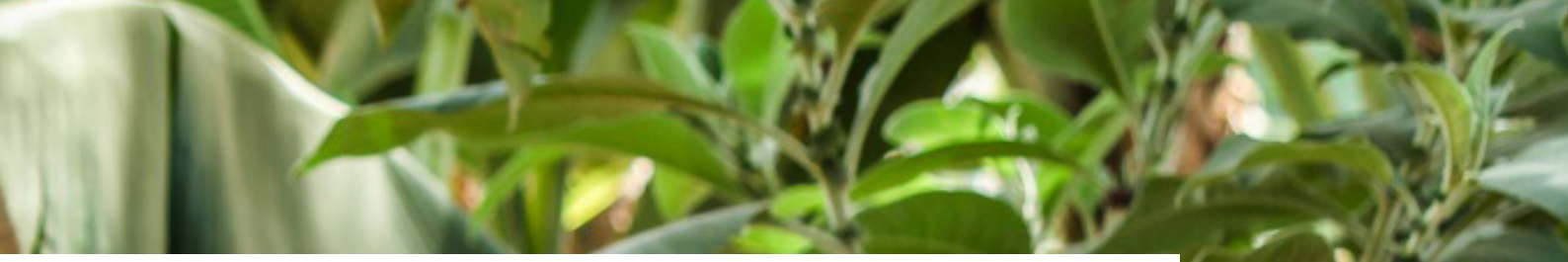

DIGITAL AGRICULTURE COUNTRY STUDY ANNEX: COMOROS

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

DIGITAL AGRICULTURE COUNTRY STUDY ANNEX: COMOROS

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

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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 Comoros 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 an 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 Comoros 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 assessed 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 attempted to assemble 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 far from exhaustive in identifying all the digital tools available. The report has the following structure:

Chapter 1:	Introduction to Comoros, 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 Comoros 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. Comoros did not have any CCARDESA Information, Communication and Knowledge Management (ICKM) focal points at the time of the study. The research team worked with a National Consultant in Comoros, Mr. Mohamed Housseni.

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).

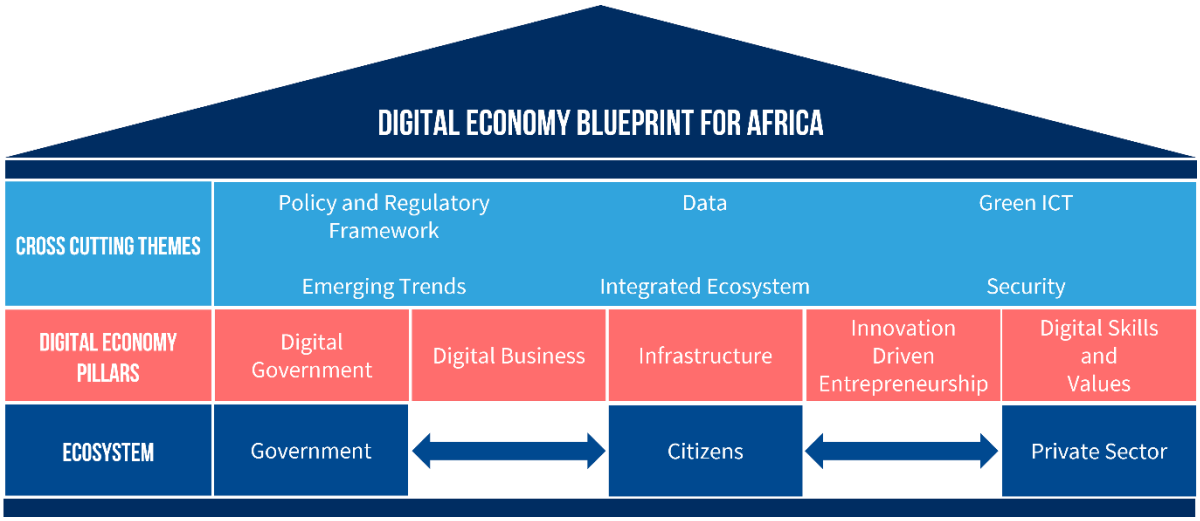

FIGURE 1 OVERVIEW OF KENYAN DIGITAL ECONOMY BLUEPRINT

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 for public service delivery.	The development of a robust marketplace for digital trade, financial services, and 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 all pillars has provided a comparable 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	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 Comoros. 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 (where they were available) 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 available 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, and local networks supplied 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 attempted to validate all identified innovations available (national and regional innovations in that country) and in some cases, were able to identify contact information of the innovators which was then uploaded into a Google Form. Some regional innovations which claimed they were implemented in Comoros could not be fully validated, but this was insufficient to suggest they did not exist and so are included in the lists within.

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 *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.

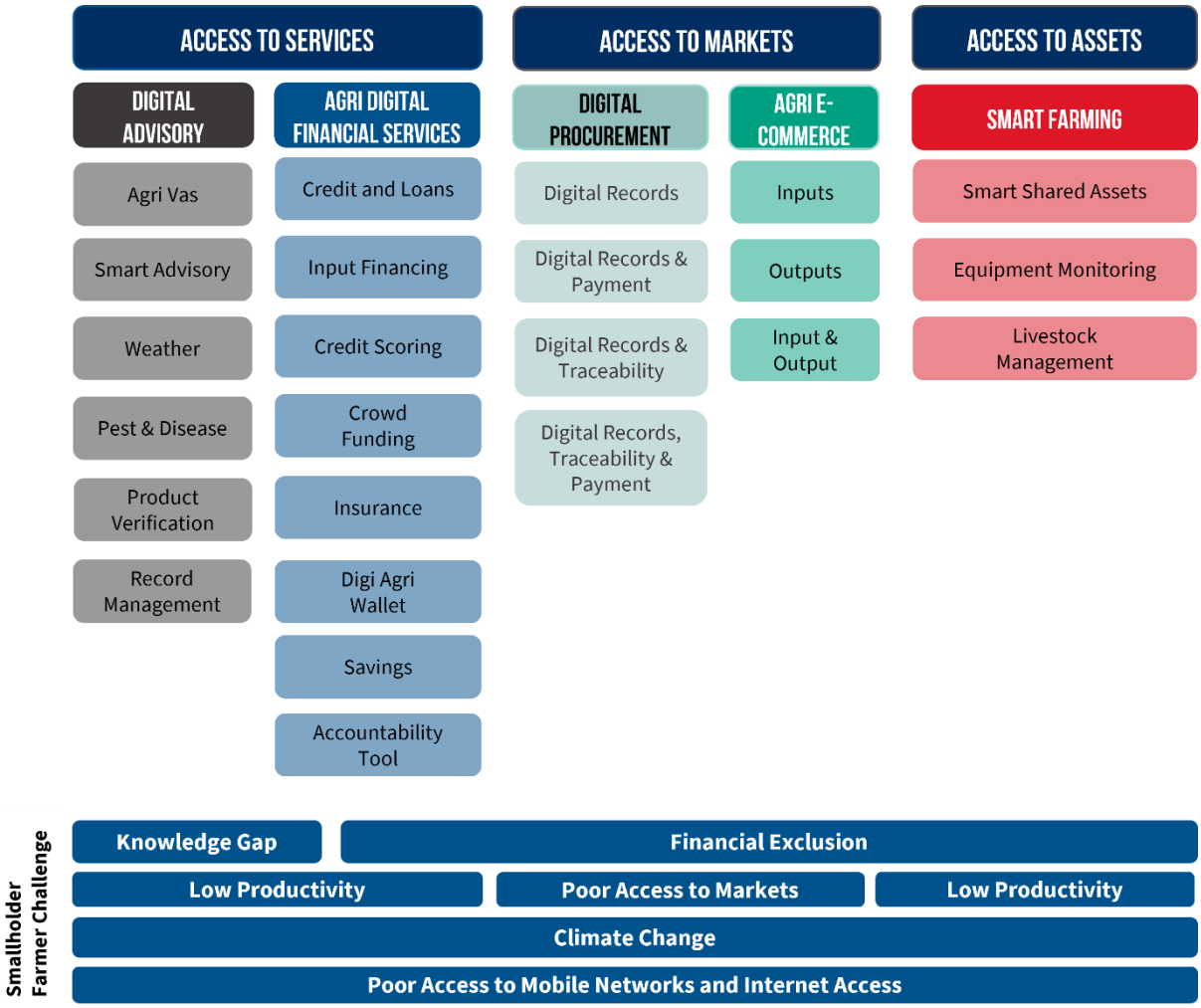

FIGURE 2 USE CASE MODEL BASED ON GSMA FRAMEWORK

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 focused to try and provide a complete picture of the region (a total of 58 difference 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 annexes 3-4 and 8-10 in the *Situational Analysis Report.*

LIMITATIONS TO THE METHDOLOGY

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 as there was no CCARDESA ICKM Focal Point. 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 Comoros 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.

Unfortunately, the national consultant for Comoros was unable to complete any Google forms for innovations despite repeated requests and therefore was also unable to identify suitable contact points. Only one survey form from a respondent reporting on a regional innovation that operated in Comoros was returned. This innovation was not verified in Comoros.

What is currently represented in the DACS for Comoros is what the study team were able to find from available information in the public domain. The nature and depth of the examples are disappointingly limited as a result. Due to covid-19 restrictions in the country physical meetings were challenging and the islands are some distance apart and logistically challenging to travel under a contract of only a few days. It is debatable whether the research collected can provide a reasonable overview of the current landscape, despite an acknowledgement from the study team and national consultant that the digital agriculture field is substantially underdeveloped in Comoros to date.

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 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.

In Comoros, there were no survey responses and therefore a challenge to understand the degree to which digital skills training was in place, despite an email exchange there it was not possible to pin down a representative to participate in a KII from departments of the University outside the agricultural faculties.

1.3 COUNTRY CONTEXT

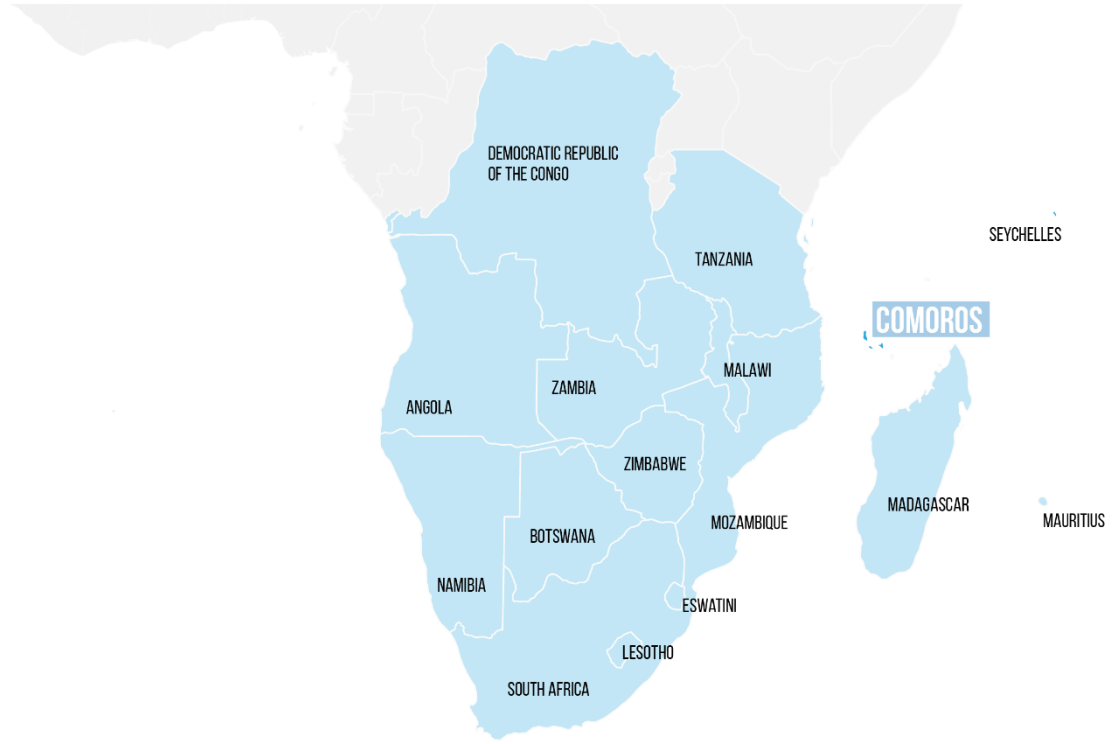

FIGURE 3 MAP OF COMOROS IN SADC

Comoros is a volcanic archipelago off Africa's east coast and has one of the smallest populations in SADC, of 869,595.[1] The UNDP's Human Development Indicators[i] rank Comoros as 156th out of 190 countries and 10th out of the 16 SADC countries[2]. The country scores on the lower scale in the region for gender equality with a Gender Development Index of 0.891.[ii] It is one of the poorest countries in the SADC region with a Gross National Income per capita of $3,200 (compared to an average of $8,050 in the region) but is classified as a lower middle income country by the World Bank Development Indicator.[3] Although 37.3% of the population falls under the UN Multidimensional Poverty Index,[4] 42.4% live below the poverty line according to the World Population Review.[5] This is slightly above the average rate of the SADC region of 40.8%. The median age of Comoros' population is also slightly younger than the average in SADC at 20.4 years (versus 22.1 years).

AGRICULTURE ENVIRONMENT

In the case of urbanization, Comoros is below average in the SADC region with 29.2% living in urban areas. Although 33.07% of the GDP is earned in agriculture, 34.38% of the population works in the agriculture sector (lower than the average of the SADC region of 43.37%) which may be explained by a limited portfolio of agricultural opportunities by virtue of the more limited conditions supporting agricultural commodities in an island nation.

[i] The Human Development Index (HDI) is a summary measure for assessing long-term progress in three basic dimensions of human development: a long and healthy life, access to knowledge and a decent standard of living.
[ii] The Gender Development Index (GDI) measures gender inequalities in achievement in the three basic dimensions of human development.

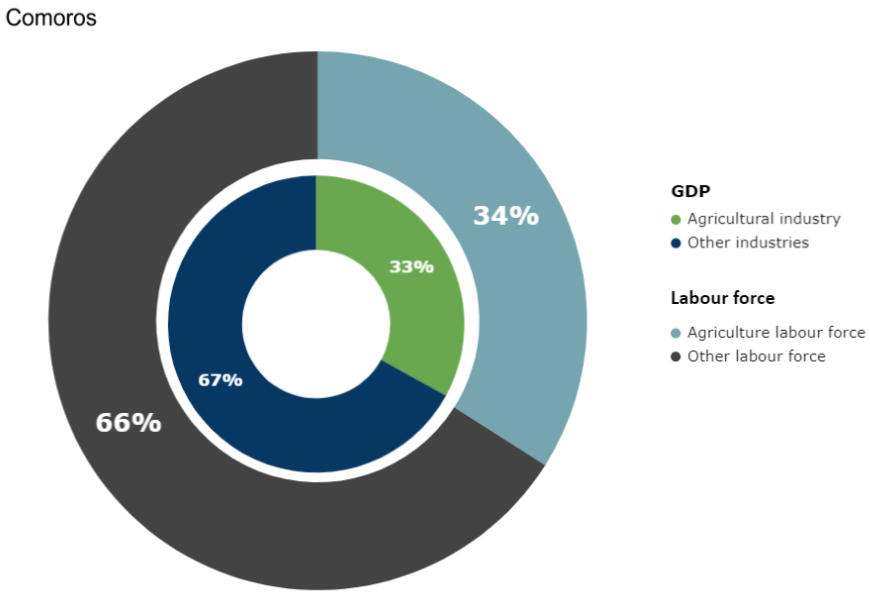

FIGURE 4 COMOROS' AGRICULTURAL INDUSTRY SHARE OF GDP AND THE SHARE OF THE AGRICULTURAL LABOR FORCE

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[6]. 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.

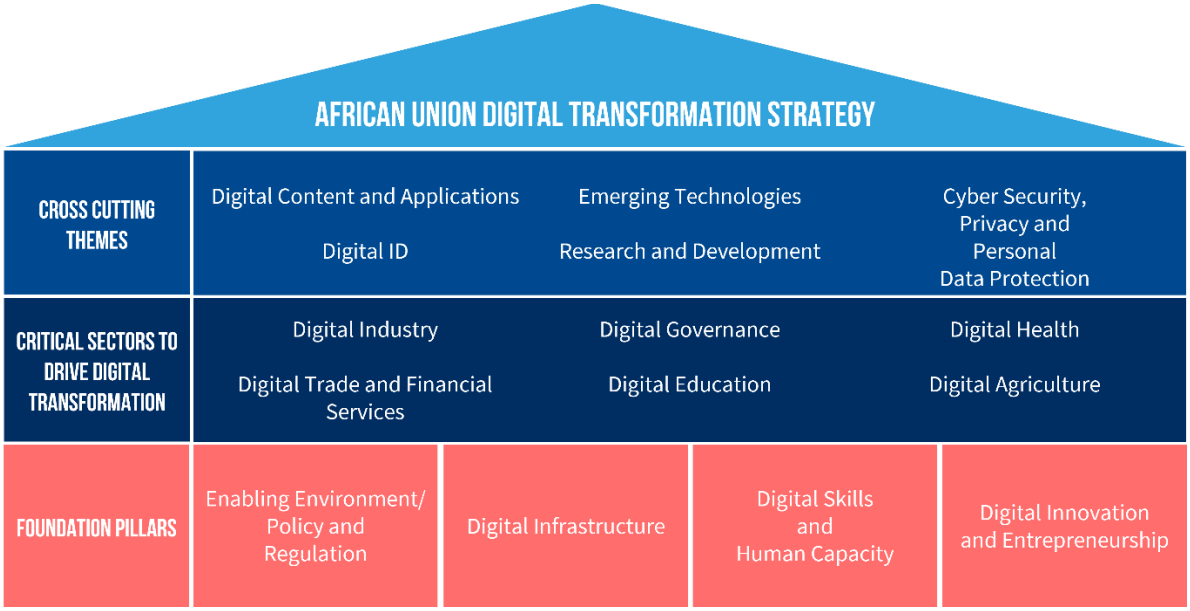

FIGURE 5 OVERVIEW OF THE AFRICAN UNION DIGITAL TRANSFORMATION STRATEGY

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[7].

BENCHMARK ASSESSMENT FINDINGS

The purpose of the benchmark is to provide a context to the findings and identify where SADC countries are advancing or where they may be behind or developing slowly 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, the assessment results and regional trends can be found in the *Situational Analysis Report,*

The results for Comoros are illustrated in table 3.

TABLE 3 BENCHMARK PILLAR SCORES: COMOROS

Comoros	Score	Maximum Score
Digital Government (OSI, 2020)	0.124	1
Digital Business (GCI, 2019)	N/A	100
ICT Infrastructure (AIDI, 2020)	9.580	100
Innovation Driven Entrepreneurship (GII, 2021)	N/A	100
Digital Skills (GCI, 2019)	N/A	100
Policy and Regulatory Frameworks (ITU, 2021)	28.000	100

The benchmark assessment identified four clusters of countries:

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

TABLE 4 OVERALL BENCHMARK ASSESSMENT RESULTS AND RANK FOR ALL 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: COMOROS

In the benchmark assessment Comoros ranked 16 out of the 16 SADC member states. Figure 6 below, illustrates the results of the benchmark in comparison to the global and African medians. Comoros only had data available for three pillars: Digital Government, G5 Digital Economy Benchmark, and ICT Infrastructure. It scored poorly in all three of these indicators. The benchmark suggests that Comoros may be lacking in some key foundational areas necessary for a robust digital economy.

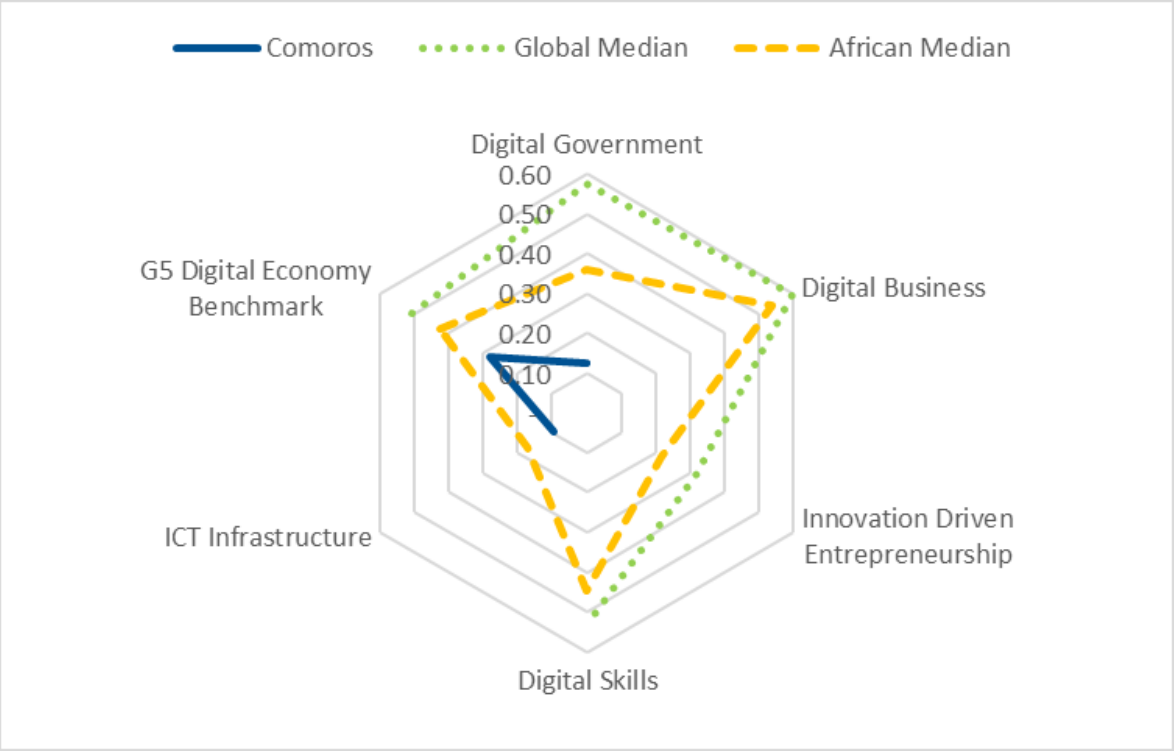

FIGURE 6 RESULTS FROM BENCHMARK ASSESSMENT FOR COMOROS

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

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

In Comoros, 8.5% of the total population is using the internet.[8] This is much lower than the regional average of 29.94%. The GSMA Mobile Connectivity Index shows an 86% access to the 3G network,[9] which complements the HDI report of mobile cellular subscriptions at 59.9 per 100 people.[10] There is no information on Comoros for the Inclusive Internet Index[11] which details the accessibility, affordability, and relevancy of internet in 120 countries. However, according to the Mobile Connectivity Index,[12] Comoros is ranked number 15 in terms of overall mobile connectivity in the SADC countries with an overall index of 24—which disqualifies it as an emerging country (above 35). It scores below average for consumer readiness, affordability, availability of infrastructure and content and services.[iii] There is also no information on Comoros in terms of ICT adoption, future orientation of the government, innovation capability index and even the GCI 4.0 Digital Skills Among the Population Index[13] .

[iii] 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 Comoros ranked 16 out of 16 in the region, lagging in all indicators available. The low scores and ranking in the assessment pillars indicate that Comoros 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 Comoros 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 the majority 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[14]. 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[15]. 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[16].

2.1 GENERAL DIGITAL POLICIES

The stock take of available policies, strategies and legislation supports the benchmark assessment results but also suggests that Comoros is at the start of a digital transformation driven by two key documents.

POLICIES, STRATEGIES AND PLANS

Sourcing and obtaining documents for Comoros was very challenging with little to no information available online and no CCARDESA ICKM focal point. The only documents that were available for review were two new strategies that were obtained from a specific website dedicated to the digital strategy in Comoros.

The **Digital Comoros 2028 Strategy** is a clear guiding document to achieve a digital economy in Comoros over a ten-year period. It aims to make the digital sector a significant contributor to the national economy and is focused around six strategic elements:

1. Human capital
2. Legal, regulatory, and institutional framework

3. Digital trust
4. Digital literacy for all
5. E-government
6. Developing and diversifying the digital sector

The Strategy has ambitious targets for increasing the contribution of digital technology to 5% of GDP by 2028 and creating 5,272 direct jobs in the digital sector by 2028. To help implement the strategy a National Digital Development Agency will be set up. Priority will be focused on diversifying the sector away from the telecommunications sector to encourage a local digital sector. This will require supporting a local entrepreneurial ecosystem, attracting investment, and promoting export-oriented services. Fishing, agriculture, and tourism are identified as priority economic sectors and targeted for the potential that digital can have to stimulate growth and improve efficiencies. Challenges remain significant for Comoros to implement the strategy as ICT usage remains low and the cost of access is high. There is a limited e-Government structure in place with few online services. The Strategy focuses on the necessary areas that are relevant for a digital economy, including cybersecurity, and is a useful guiding document to stimulate implementation of this agenda in other sectors.

The **Emerging Comoros Plan 2020-2030** provides a clear development plan for Comoros to increase its growth and involvement internationally. The Plan is based around five pillars:

- Tourism and handicrafts
- Blue Economy
- Becoming a hub for financial and logistical services in the Indian Ocean
- **Modernized agriculture for food security**
- Industrial niches to diversify the economy

It is also reliant on five catalysts to be successful:

- Reformed political and institutional framework
- Upgraded infrastructure for an efficient economy
- Human capital prepared for the future
- Structural reforms for a competitive environment
- **Digital revolution**

The Plan reinforces the Digital Strategy and the requirements necessary to achieve this goal: strengthening legal frameworks, promoting the use and dissemination of ICT, and attracting investment. While the “digital revolution” is not completely embedded within the Plan it is considered a catalyst and therefore should put it at the center of future policy and strategy planning to achieve the goals set out.

2.2 LEGISLATION

The legal framework relevant to this sector in the Comoros is sparse with only one relevant law in place that relates to the telecommunications sector:

- **Law 14-031/AU** is the governing framework for electronic communications in the Comoros.

Comoros is significantly lacking in relevant laws applicable to the digital economy such as digital transactions, electronic signatures and records, cybercrime, privacy, and data protection. However, these are addressed as priorities in the Digital Strategy document but whether they are currently in development could not be determined.

2.3 DIGITALIZATION IN AGRICULTURE

DIGITAL IN AGRICULTURE POLICIES

Agriculture policies and strategies were extremely limited in their availability for Comoros. There was no focal point to call upon to locate additional relevant documents. The national consultant provided some agriculture specific documents, not all were Government strategies or policies. From the limited number of documents available that were reviewed, none had reference of inclusion to digitalization. It is likely that many of these documents pre-date the digital strategy and plan presented above. As agriculture was included as a priority for food security, it is possible that new documents are in development that incorporate the digital vision into the agricultural systems of the Comoros, but this cannot be verified.

CHALLENGES

The Emerging Comoros Plan identifies a modernized agriculture sector as a key pillar to achieving growth and prosperity and ensuring food security for the islands. It states that this will be achieved by improving the governance of the sector, diversifying agricultural production, promoting export crops, and developing infrastructure and institutions conducive to supporting the sector. The Digital Strategy also references the agriculture sector as one that has huge potential in creating growth through the implementation of digital technologies.

However, sourcing documents for Comoros has been a significant challenge as the majority of these are not available online through the Government portals. Common feedback when interviewing public sector stakeholders across the SADC region within Agricultural Ministries has been the lack of knowledge and accessibility to understand what policies and strategies are currently in place and how they relate to the sector. It is clear from the two documents reviewed that digitalization is being embraced in the Comoros as a key feature of development, and agriculture has a role to play in this, but how and to what extent is unclear.

A key barrier to embracing digitalization in agricultural systems is a lack of a guiding policy or strategy that adequately integrates the use of technologies and services. A clear policy or strategy for agriculture that includes smallholder farmers, and the private sector could be used as an advocacy tool to push for greater funding and prioritization. With the Digital Strategy published there needs to be a drive to push the agenda further with greater stakeholder involvement. There will be challenges that will need to be addressed, such as limiting factors to access of ICTs and networks, and these are out of the control of the Agriculture Institutions but their role in pushing the sector specific priorities and opportunities should not be underestimated.

3 THE DIGITAL AGRICULTURAL INNOVATIONS

This chapter provides to an extent possible, a very preliminary and early-stage stocktaking analysis and where possible the numbers, scope, trends, and characteristics of digital agricultural innovations in Comoros.

3.1 MAPPING DIGITAL AGRICULTURE INNOVATIONS

The DACS for Comoros has characterized use cases according to a typology and framework developed by GSMA (See the 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 Comoros. A total of 5 innovations were identified in Comoros that had a mix of use cases, illustrated in figure 7 below[iv]. Of these identified innovations, two operated regionally and three operated in Comoros only.

The three innovations identified that only operate in Comoros (Huri Money from Comoros Telecom, Mvola Money from Telma and HOLO from the Comorian Development Bank) did not fill out a survey as contacts for these providers could not be obtained through the national consultant. These three innovations all provide digital financial services, although are not dedicated to agriculture.

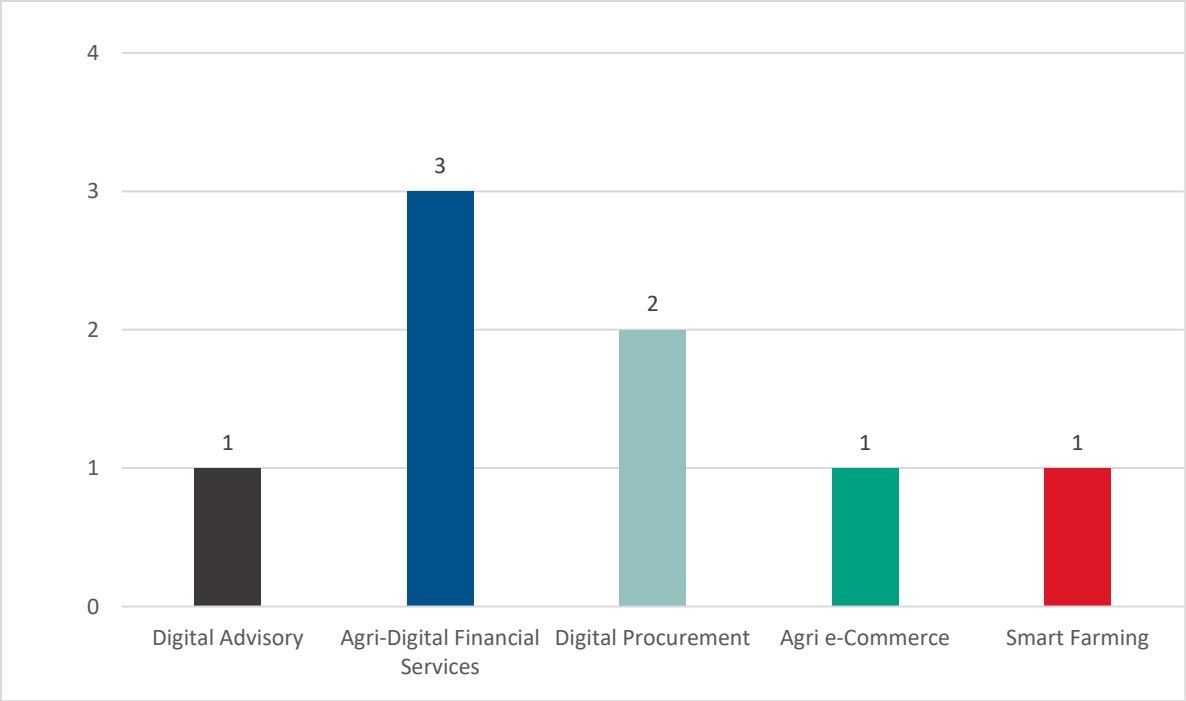

FIGURE 7 IDENTIFIED USE CASES FROM INNOVATIONS IN COMOROS

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.

[iv] Although not included here, the national consultant also identified that traders between Comoros and Kenya are using Vodafone M-PESA financial services from Kenya to trade with Kenyan counterparts in and near Mombasa.

3.2 IDENTIFIED AGRICULTURAL INNOVATIONS OPERATIONAL IN COMOROS

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 COMOROS

					Name of innovation	Name of the company	Survey ✓/X	Description of innovation	Operational Countries in SADC
■		■		■	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. The innovative solution provides - through the use of computers, satellites and Earth Observation - 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, Botswana, Comoros, DRC, 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.	Angola, Botswana, Comoros, Democratic Republic of Congo, Eswatini, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Tanzania, Zambia, Zimbabwe

	■				Holo	Comorian Development Bank	X	Holo from the Comorian Development Bank was launched in 2019 as a mobile banking solution and as an advancement for digital financial inclusion. It has the support of TagPay its technology partner. The service offers all its customers and users a full range of banking services accessible from any type of mobile phone, regardless of the telecom operator or with or without internet. The solution enables deposits and withdrawals of money instantly, transfers, payment or receipt of wages, payment of bills, safe purchasing transactions, reload of phone credit. This electronic account is attached to a phone number and are available on Android and iOS systems or using a simple first-generation phone. The service requires contact with an agent and registration. 7Holo already has 10,000 registered users. The bank has modified their minimum requirements to encourage users to open accounts, have built a broad network of agents and merchants and are adapting their offerings to provide more relevant services. Services are being used for salary disbursements, bills, and tier payments, cashing In and Out or money transfers to other Holo clients or to other accounts. Their intention is to introduce QR codes to address merchants who do not want to have terminal POS for accepting payments.	Comoros
	■				Huri Money	Comoros Telecom	X	Huri Money was launched by Comoros Telecom in 2021 (sole provider of wireless, broadband, and fixed line services in Comoros since 2016 and mobile services in 2003) with a mobile platform to enable their customers who were already supported by internet, fixed line, and mobile phones with an opportunity to conduct banking transactions. The approach ensures significant efficiencies for all citizens who had to travel even between islands to access physical banks. Now the services will be provided by concessionary organizations on site. The mobile money account enables cash transfers between individuals, payments for products and services and B2B transactions, cashing out and paying for credit for mobile accounts. The formal launch of Huri Money took place in 2021 together with a mobile platform to enable Comoros Telecom customers to easily conduct banking transactions. The approach will reduce travel times for users since the services will be provided by concessionaries on site. This mobile money account enabling transfers, cashing out, recharging telephone credit and payment services. Their SIM card is at 2,000 KMF without credit. Top-ups are widely available. With Huri you need to	Comoros

								add a 50 KMF fee to every 500 KNF face value in all stores, except CT agencies. To top up, enter *123* followed by the voucher code. Check balance by #123#.	
	■				Mvola mobile money service	Telma Mobile	X	Telma Mobile is a Madagascar-based telecommunications company provided with a license in 2015 and they began rolling out their network in 2016. They recently rolled out the Mvola Avance and Epargne products, which offer loans and savings services, respectively, through the pre-existing Mvola mobile money service. This is newer market player since 2016 and has provided real competition to the monopoly provided by Comoros Telecom previously. By the end of 2016 60% were already covered by 4G and they promised to cover all islands by the end of 2017. Telma doesn't block VoIP providers like Skype or WhatsApp calls. They also feature very cheap calls to neighboring French Mayotte. They might be the smarter alternative once they have full coverage now. At least they brought the incumbent to cut prices. 5With Mvola Avance, customers can borrow from MGA 1,000 to MGA 500,000 (USD 0.30 to USD 157) for 30 days with a flat interest charge of 9 percent. Mvola Epargne allows customers to save between MGA 100 and MGA 10 million (USD 0.20 and USD 3,200) and earn annual interest of 2 percent. These services were developed in partnership with BNI Madagascar, which is controlled by Mauritius-based holding company Ciel Group. As of 2016, Mvola had 2 million customers performing: (1) mobile payments for Telma services; (2) cash uploads; (3) transfers to individuals; and (4) cash withdrawals through partner bank machines and branches. Also as of 2016, Telma Mobile reported 3 million subscribers and annual turnover of MGA 360 billion (USD 112 million). Founded in 2006, Telma Mobile is a member of the Telma Group, a private firm providing mobile phone, internet, and infrastructure services. BNI Madagascar reported outstanding loans of MGA 882 billion (USD 273 million) in 2016. Founded in 1977, Ciel operates in 11 African and Asian countries and reports a group profit of MUR 1.5 billion (USD 44.5 million) before tax and non-recurring items as of 2017. Their SIM card is at 2,000 KMF without credit. Top-ups are widely available. They sell one combo bundle called Karibu. It contains 60 minutes to Telma, Mayotte, India, China, Réunion, Saudi Arabia, US and Canada plus 100 SMS and 1 GB in Comoros. It valid for 1 month and sold for 4,000 KMF. Activation is by *445*50#. They sell a reduced welcome package for a 5,000 or 10,000 KMF	Comoros

								recharge card with 180 dom. minutes, 15 SMS and 100 MB plus the recharge value. There are data packages called TelmaNet are offered and can be added to the basic service.	
					PRESAN (Program Régional de Sécurité Alimentaire et Nutritionnelle) platform	Indian Ocean Commission	X	PRESAN -The Indian Ocean Regional Program on Food Security and Nutrition (PRESAN) provides a framework for strategic collaboration and implementation of joint activities which include outreach and communications, information sharing, resource mobilization and technical support to improve food and nutrition security amongst IOC Member States Comoros, Madagascar, Mauritius, Reunion, and Seychelles. It is supported by FAO and IFAD and enables FAO to provide technical support necessary to respond to urgent needs in the region, such as the reduction of the deficit of the agricultural trade balance. There is opportunity for join resource mobilization activities and technical support for Small Island Developing States (SIDS)	Comoros, Madagascar, Mauritius, Seychelles

3.3 RESULTS FROM SURVEY RESPONDENTS

Unlike the studies in other countries, only one identified digital innovation for Comoros received an invitation to fill out a survey. The results in this section provide an overview of the one innovation that completed the survey, which is a regional innovation present in all SADC countries, GeoFarmer.

USE CASES AND SUB USE CASES

The breakdown of use cases presented in figure 8 below is only for one innovation with an equal share between digital advisory, digital procurement, and smart farming. It is also clear that looking at the innovations identified through internet searches, but for which contact points and surveys could not be established, a predominance of recently launched digital financial services. Whilst these are not exclusively for farmers or a rural population, we have direct evidence of at least 89 individual agribusinesses, agricultural enterprises or traders in the agricultural sector that are currently (and particularly during the pandemic) utilizing digital financial services through our national consultant who travelled to three of the main islands in the Comoros (Grande Comore, Moheli and Anjouan within the archipelago).

Figure 8 also illustrates a comparison of use cases to the rest of the identified innovations in the SADC region.

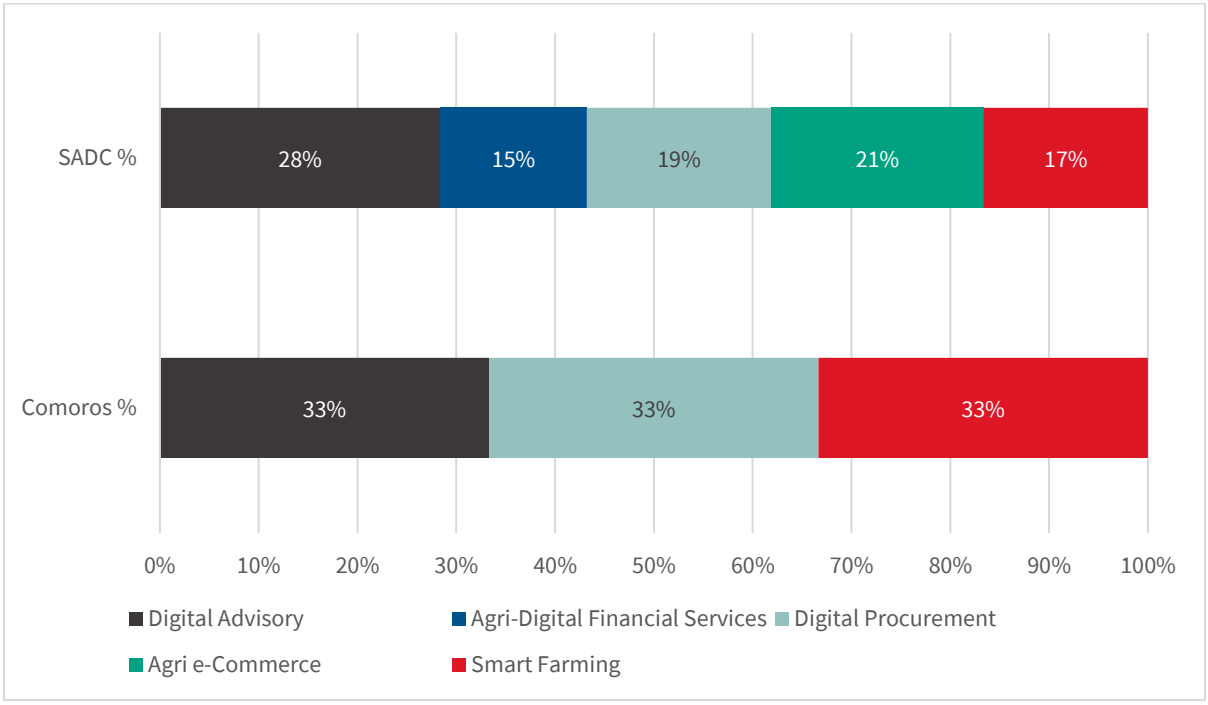

FIGURE 8 DIVISION OF USE CASES FOR SURVEY RESPONDENTS IN COMOROS VS. IDENTIFIED INNOVATIONS IN SADC

Unfortunately, again due to only one regional survey respondent, the sub use cases are limited to only one example but illustrated in figure 9. It is highly likely that a few use cases including Digital Financial Services, mobile wallets and e-money, savings and potentially loans are available through the service providers identified. There are also likely to be transfers from individuals and to individuals from business paying digital money salaries.

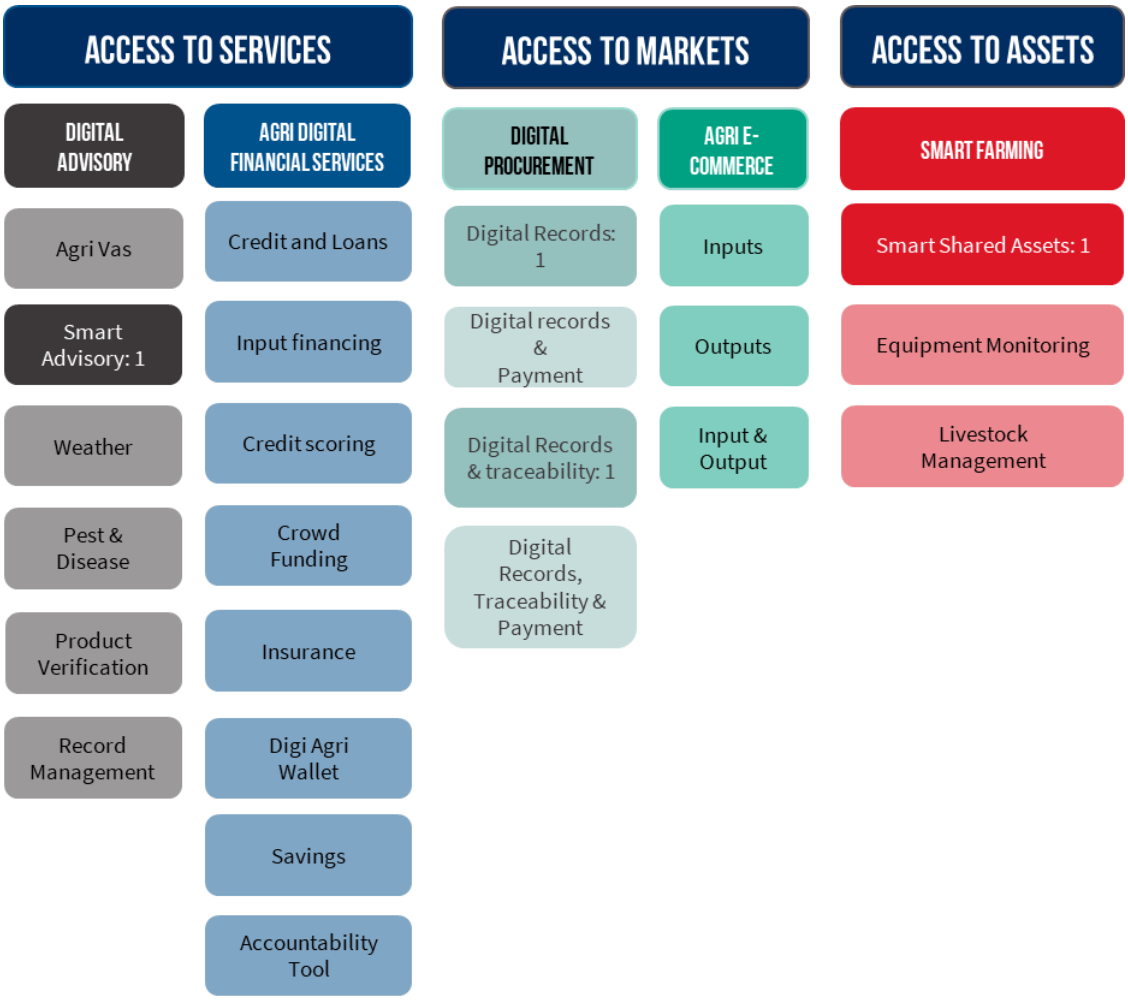

FIGURE 9 OVERVIEW OF SUB USE CASES PRESENT IN SURVEYED INNOVATIONS IN COMOROS

TECHNOLOGY AND CHANNELS

The one survey response, suggests the innovation relies on computers and satellite/earth observation and a website and GeoData. This innovation was launched in 2017 and use spreadsheets, cloud based databases and software, and AI-enabled Machine Learning. They charge business subscription fees and have developed their innovation with other stakeholders including government. They suggest their innovation is inclusive but has taken no specific actions to enable this. They suggested challenges were present in reaching enough clients in the region, whether this is a reference to island states or more broadly is unclear.

VALUE CHAIN PHASES COVERED AND SCALING

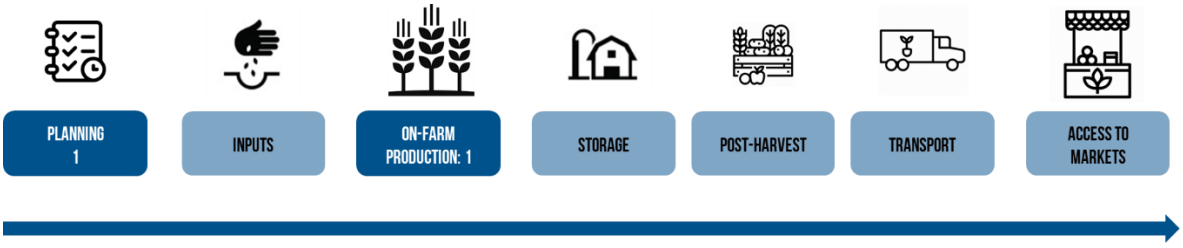

FIGURE 10 SURVEYED INNOVATIONS PRESENCE IN THE VALUE CHAIN IN COMOROS

The main parts of the value chain which the one innovation supported was planning and on-farm production related to agricultural smart advisory and digital procurement solutions. Similarly, the scaling stage of this private sector innovation was at a level of sustainable scale and regional in its footprint.

4 DIGITAL AGRICULTURAL SYLLABI AND ENTREPRENEURSHIP TRAINING

The Digital Comoros 2028 strategy plans to review and improve the training curriculum to meet the changing needs of the digital sector by strengthening and diversifying the ICT training offer.

To optimize the employability of trained young people, the Digital Comoros 2028 strategy is based on a solid partnership between training establishments and companies, the establishment of vocational training courses, the insertion of digital entrepreneurship training modules in the training curricula as well as the establishment of mechanisms to facilitate and encourage young people to become digital entrepreneurs.

Internet penetration in the Comoros was reported by the World Bank to be 8% in 2020[17]. The ITU (2018) reported that Comoros, was being supported by the World Bank to expand its development policies over the years[18]. A key pillar of the development policies has been to increase competition in the ICT sector by licensing additional operators and introducing mobile and fixed broadband services. The lack of competition previously led to high costs of internet bandwidth and low internet coverage and usage.

4.1 AGRICULTURAL SYLLABI UNIVERSITIES

In Comoros, the Institut Universitaire de Technologie des Comoros (IUT) through the Director General was approached through contact details provided by the national consultant but unfortunately, they did not fill out the survey but made the following comments.

'I believe that you are looking at institutions which provide training in the agricultural field, and which use digital technologies. In our institution which is the University Institute of Technology for Comoros, we have six departments namely Computer Engineering, Civil Engineering, Trade, Business Management and Administration, Tourism and Statistics by training in the Agricultural field. We use digital technology at several levels since it is about '' teaching with and through digital." I am in the statistics field, and they have agricultural statistics modules which are also combined with Agricultural modelling.'

4.2 INCUBATORS AND INNOVATION HUBS

A total of three business support organizations have been mapped in the country, one of which is operating in the agricultural sector.

The general business support organizations without explicit focus in the agricultural sector that have been identified are Incubateur Innov'lab des Comores and Com'Work. For these organizations there was little if any evidence of training and incubation activities dedicated to agricultural entrepreneurs and therefore, they were not targeted for a KII. The agriculture-related business support organization identified and contacted is the Union of Chambers of Commerce of the Comoros (UCCIA). One business support organization took part in a qualitative KII.

INNOV'LAB - UNION OF CHAMBERS OF COMMERCE OF THE COMOROS (UCCIA)

Innov'Lab is a business incubator launched by the Union of Chambers of Commerce of the Comoros (UCCIA) in 2016. The incubation program duration is six months and hosts approximately 25 incubees per cohort. Training sessions are organized for the benefit of students to instill an entrepreneurial culture in collaboration with the University of the Comoros. Regarding digital trainings, they currently don't teach any digital skills specifically, but they have recently signed a partnership with the UNDP to integrate digital skills in the incubation program. They also collaborate with Comor'Lab and the *Maison de l'Emploi.*

The target of their trainings are students, graduates and young agripreneurs. The Union of Chambers of Commerce of the Comoros also collaborates with the University's Institute of Technology.

TABLE 7 OVERVIEW OF RESPONSES FROM INTERVIEWED INCUBATORS IN COMOROS

COMOROS INCUBATORS	
Innov'Lab	
Year of Establishment	2016
Agri start-ups incubated	More than six
Target of Digital Agri trainings	None
Digital Skills trainings	Students Young entrepreneurs
Digital Agri Tools taught	None
Collaboration with Universities and Colleges	University of the Comoros Institut Universitaire de Technologie
Supported by the Government?	Yes

5 INSIGHTS AND REFLECTIONS

The following section outlines the key insights from the data collected of the DACS and towards the end of the report signposts some broader reflections relevant to this country from the *Situational Analysis Report* Due to the number of challenges in data collection, the insights the team was able to obtain from the data is limited.

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 multi-stakeholder processes to define clear approaches based on agreed priorities will be necessary.

5.1 INSIGHTS

BENCHMARK RESULTS

Comoros ranked last in the benchmark assessment which suggests that it may be lacking in a high proportion of key foundational areas necessary for a robust digital economy and is 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. Comoros scored poorly in all assessment pillars, although data was unavailable for digital business, innovation driven entrepreneurship and digital skills.

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. Comoros 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.

POLICY ENVIRONMENT

The benchmark assessment suggested that Comoros' digital economy is lagging, however the stock take of national policies, strategies and legislation identified that there are early indications that digitalization is being prioritized. It seems that Comoros is in digital transition and could leapfrog the more conventional stages of policy development as it has a digital economy strategy published which suggests a level of prioritization of this agenda. This shows great opportunity for Comoros which is somewhat dependent on the agriculture sector for economic growth and employment. The momentum must be continued and directed towards the agriculture sector which may require much investment to support the transition as many of the foundational pillars to enable digital transformation were underdeveloped.

The presence of these documents should not be interpreted to understand that the digital ecosystem in Comoros is advanced, that cannot be verified due to the limitations identified in Chapter 1. It can suggest that Comoros has realigned its focus to understand how leveraging a digital economy can support its developmental goals. Agriculture is featured within the national plans as a key pillar and the task now is implementing the plans included in the digital strategy across Government and producing a parallel policy or plan that is specific to the sector which can address the challenges and opportunities relevant to food security

that exist within Comoros. Ideally, this would be collaborative between all stakeholders including the farming community, innovators, the private sector, and other government bodies involved in alleviating digital barriers.

DIGITAL AGRICULTURE INNOVATIONS

A total of five innovations were identified in Comoros, but only one responded to the survey. The very limited information the study team were able to collect on the Comoros ecosystem was able to identify that the innovations that were either digital agricultural innovations or digital innovations serving a predominantly rural and farming population. At least two innovations were regional with operating or registered activities in Comoros.

The services were mainly launched between 2017 and the digital wallets or e-money interventions were more recent from 2018- 2021, all were private sector initiatives. The innovations represented sub use cases across access to services, market, and assets. The single innovation in the survey in Comoros address planning and on-farm production and dealing with smart advisory or smart farming and climate or geodata and its integration. The challenges cited by this example refer to reaching enough clients in the region.

This statement is particularly interesting for Comoros where the internet is highly variable and uncertain and most of the channels for this innovation focused on computers, satellites, website, and spreadsheets, both clouds based and local and with AI functionality. This regional innovation had scaled whereas the FinTech innovations found are still at a very early stage and other digital innovations in Comoros at an ever earlier stage. The survey respondents charge business subscription fees for revenue generation and some transaction or premium based service fees. The technology used is believed to be inclusive already.

DIGITAL AGRICULTURAL SYLLABI AND ENTREPRENEURSHIP TRAINING

In terms of assessing digital skills development, the study suggests training for skills development in Comoros is at a preliminary stage and underdeveloped, particularly for specific sectors such as agriculture. The training at the University appears to be general in nature and would be considered limited in the development of AgriTech entrepreneurs. This systematic upgrading is necessary to ensure that young people can fulfil the expectations of the 2028 Digital Strategy in Comoros. There is an urgent need to support capacity building in the Digital Agriculture sector for universities and incubators and this should be a priority for the country. It is highly likely that this capacity building will be required in policy making circles simultaneously, to help policymakers understand the potential for digital within the economy effectively.

5.2 REFLECTIONS FROM THE SITUATIONAL ANALYSIS

This document has presented the available data collected for Comoros 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 Comoros include:

- **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. The initial help provided by the World Bank, could facilitate Comoros having a clear set of policies and strategies to encourage a digital agricultural revolution in Comoros, creating jobs and enhancing resilience in the food system.

- **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.** With French and Arabic as the key languages, there are other countries employing digital agricultural tools from which to learn and indeed share data and information that does not require contextualization. Most agricultural research content is created in English and approved content is usually only available in a national language, but not all farmers understand either of these. Countries whose first language is not English are likely to be at a real disadvantage in terms of content generation and/ or adaptation. The trick is to design a scalable system that is still able to contain hyper localized and relevant content about value chains, specific inputs that are available, soils, etc.

- **Appropriate training programs that take into consideration the local languages and the local contexts will be a priority particularly for agriculture which demands relevant and local content.** If farmers are to be trained how to use their mobile devices appropriately, the training content must be in the local languages, more easily understandable by farmers and using imagery to guide action. Furthermore, it is likely that these program in dealing with low levels of literacy will require image or gamification-based approaches to enhance understanding of information by farmers more visually.

- **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.** Digital agriculture must be guided by local priorities, policies, and capacity development in an on-going manner and must be promoted among incubators and innovation hubs to prepare the local youth to invest in the sector and develop new services for the local farmers and agricultural stakeholders.

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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