DIGITAL AGRICULTURE COUNTRY STUDY ANNEX: MAURITIUS

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

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CCARDESA
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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

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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 Mauritius is an annex to the *Situational Analysis Report* and provides a portrait 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 Mauritius 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 Mauritius, 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 Mauritius 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 Mauritius, Mr. Goolaub Akhilalandjee, Assistant Director, Food and Agriculture Research and Extension Institute of the Ministry of Agroindustry and Food Security. The ICKM focal point was the first point of contact in identifying possible policies, digital agricultural innovations and contact points at institutions of Higher Education in Mauritius. The study team worked with a nationally recruited consultant, Mr. Krishan Bheenick.

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).
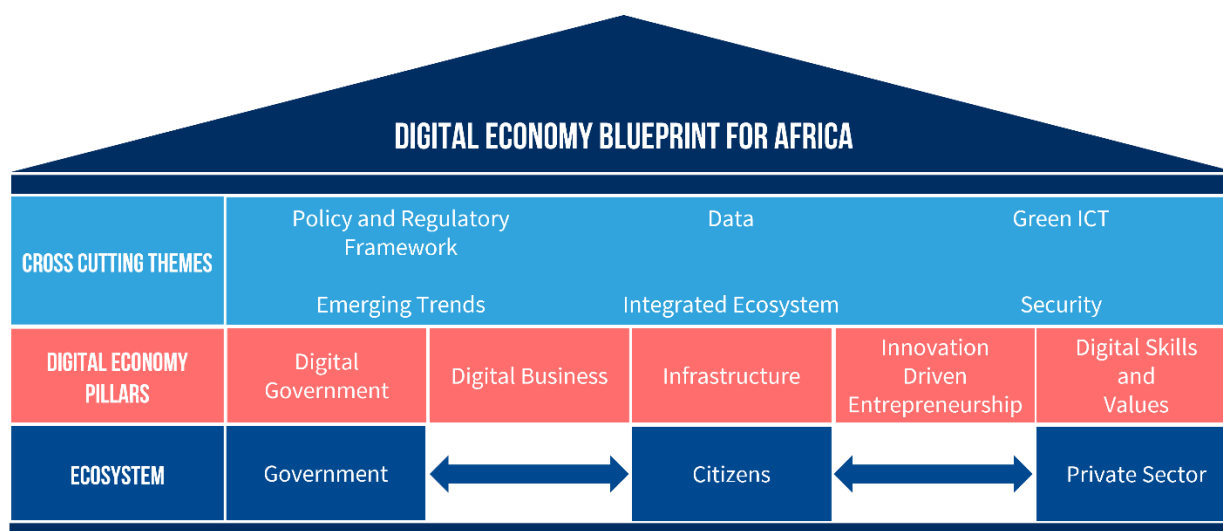
FIGURE 1 OVERVIEW OF KENYAN DIGITAL ECONOMY BLUEPRINT

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 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 all 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.

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 Mauritius could not be fully validated, but this was insufficient to suggest they did not exist and so are included in the lists.

A workshop was jointly planned with the study team and kindly hosted jointly by Regeneration Mauritius[i] and the Mauritius Chamber of Agriculture (oldest private sector institution representing the Mauritian agricultural community with a Smart Agriculture project) was also offered as a means to introduce the CCARDESA

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[i] Regeneration Mauritius is an initiative seeking to encourage and facilitate regenerative food systems through building a regional hub for technology driven and regenerative food systems alongside the development of entrepreneurial skills among local communities and students. Regeneration Mauritius have established a collaborative platform and ecosystem where people, communities and companies are enabled to create, test and scale sustainable, innovative, and transformational foodtech and food system solutions.

Digitization Study and its components to persuade innovators to provide information on their innovations and understand also the role that Regeneration Mauritius was playing in encouraging digitization in Agriculture.

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 *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.
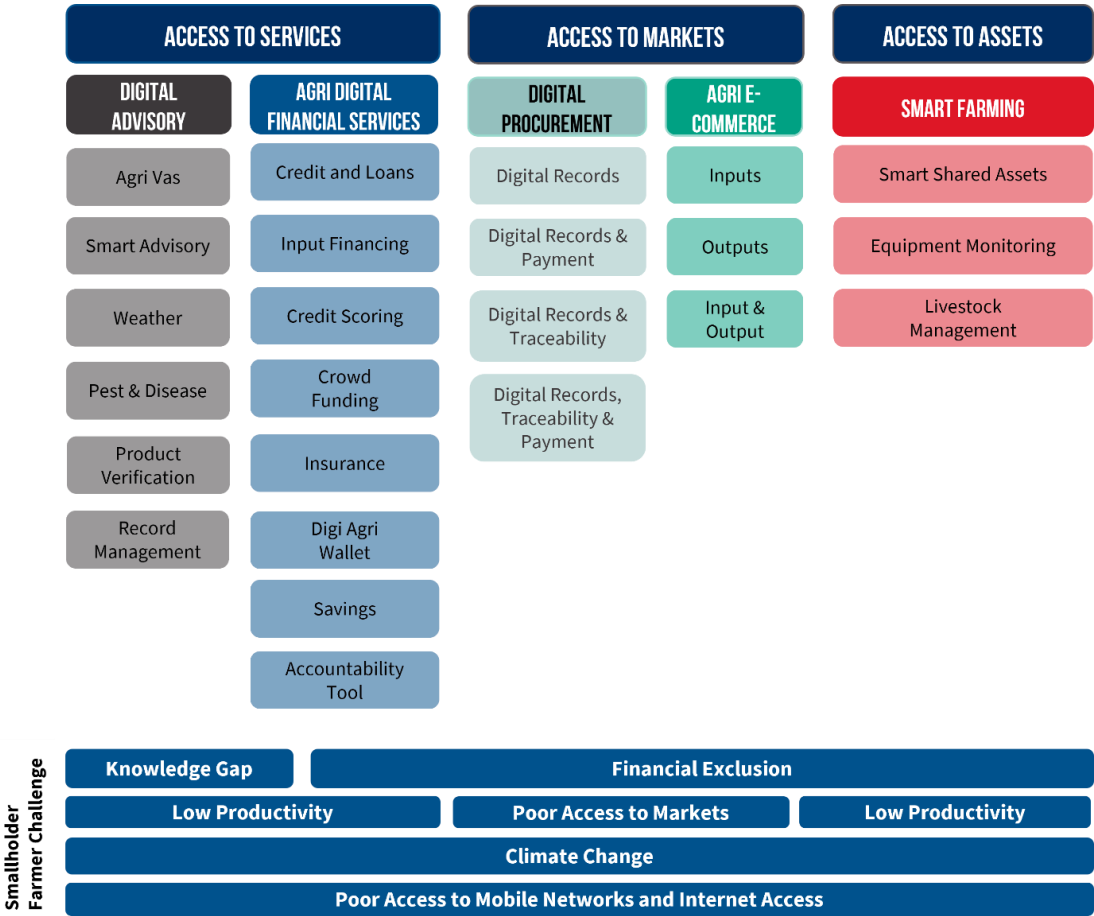

FIGURE 2 USE CASE MODEL BASED ON GSMA FRAMEWORK

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

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

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 Mauritius 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 was 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.
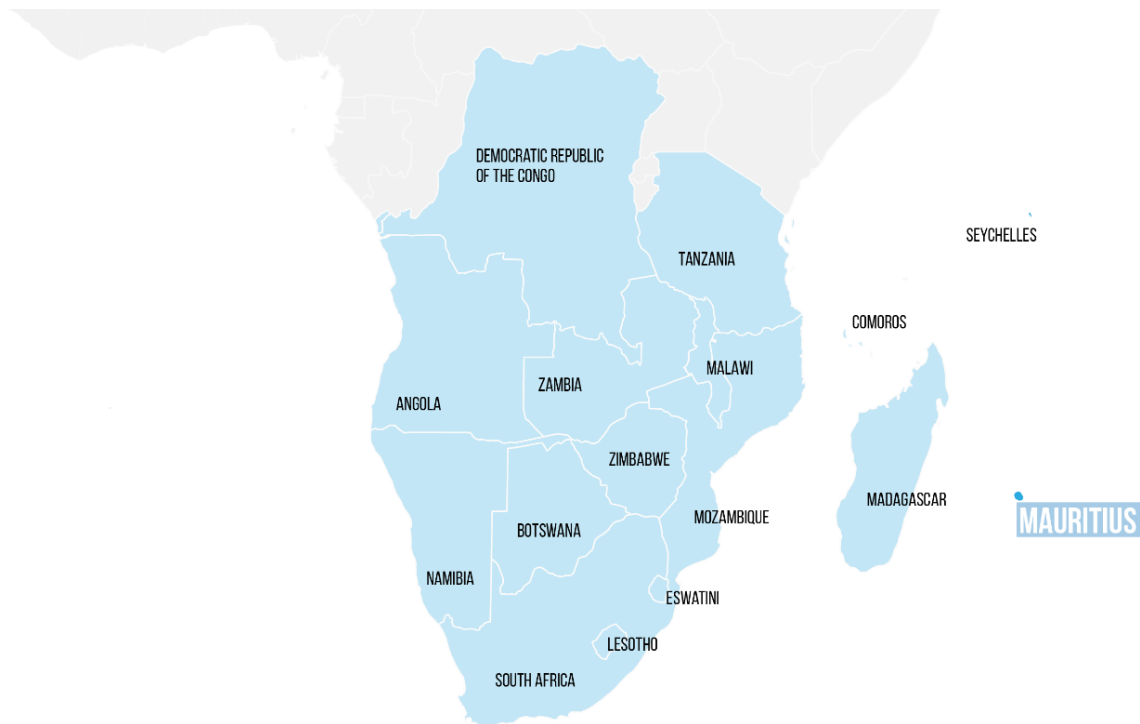
1.3 COUNTRY CONTEXT

FIGURE 3 MAP OF MAURITIUS IN SADC

Mauritius is an island nation, classified as an upper-middle income country, with a population of 1.2 million.[1] The UNDP's Human Development Indicators[2] rank Mauritius as 66th out of 190 countries and 1st out of the 16 SADC countries. These are discussed in more detail in the Insights section where they relate to the country's digital ecosystem. Mauritius scores on the higher scale in the region for gender equality with an Gender Development Index of 0.976.[ii] It is one of the richest countries in the SADC region with a Gross National Income per capita of $26,800 (compared to an average of $8,050 in the region).[3] Although there is no information on the percentage of the population that falls under the UN Multidimensional Poverty Index,[4] 10.3% live below the poverty line according to the World Population Review[5]. This is significantly below the average rate of the SADC region of 40.8%. The median age of Mauritius' population is also the oldest in SADC with 37.5 (versus the average of 22.1 years).

AGRICULTURE ENVIRONMENT

In the case of urbanization, Mauritius is slightly below the average in the SADC region with 40.8% living in urban areas. Although only 3.41% of the GDP is earned in agriculture, 5.97% of the population works in the agriculture sector (significantly lower than the average of the SADC region of 43.37%).

Mauritius

GDP
- Agricultural industry
- Other industries

Labour force
- Agriculture labour force
- Other labour force
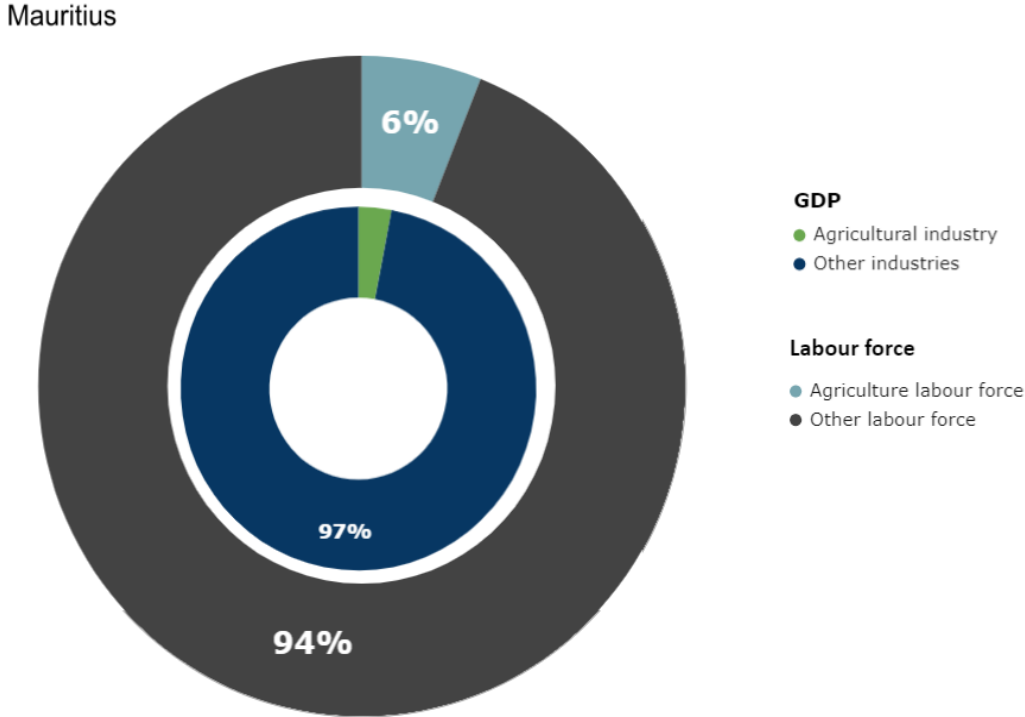
FIGURE 4 MAURITIUS' AGRICULTURAL INDUSTRY SHARE OF GDP AND THE SHARE OF THE AGRICULTURAL LABOR FORCE

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

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

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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.

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].
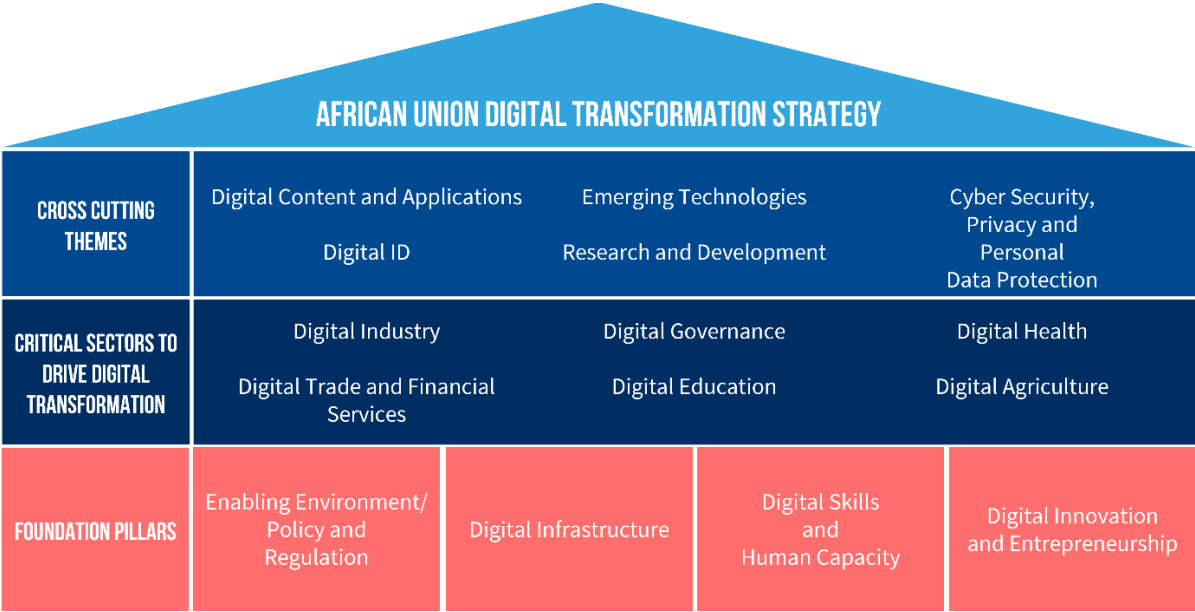
FIGURE 5 OVERVIEW OF THE AFRICAN UNION DIGITAL TRANSFORMATION STRATEGY

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, the assessment results and regional trends can be found in the *Situational Analysis Report* The results for Mauritius are illustrated in table 3.

TABLE 3 BENCHMARK PILLAR SCORES: MAURITIUS

Mauritius	Score	Maximum Score
Digital Government (OSI, 2020)	0.488	1
Digital Business (GCI, 2019)	36.720	100
ICT Infrastructure (AIDI, 2020)	9.934	100
Innovation Driven Entrepreneurship (GII, 2021)	15.000	100
Digital Skills (GCI, 2019)	24.094	100
Policy and Regulatory Frameworks (ITU, 2021)	44.500	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 Democratic Republic of Congo (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: MAURITIUS

In the benchmark assessment Mauritius ranked second out of the 16 SADC member states. Figure 6 below illustrates the results of the benchmark in comparison to the global and African medians where Mauritius exceeds all indicators. The benchmark suggests that Mauritius has a robust and mature digital economy which could provide guidance on some best practices on the adoption of an enabling environment for digital.
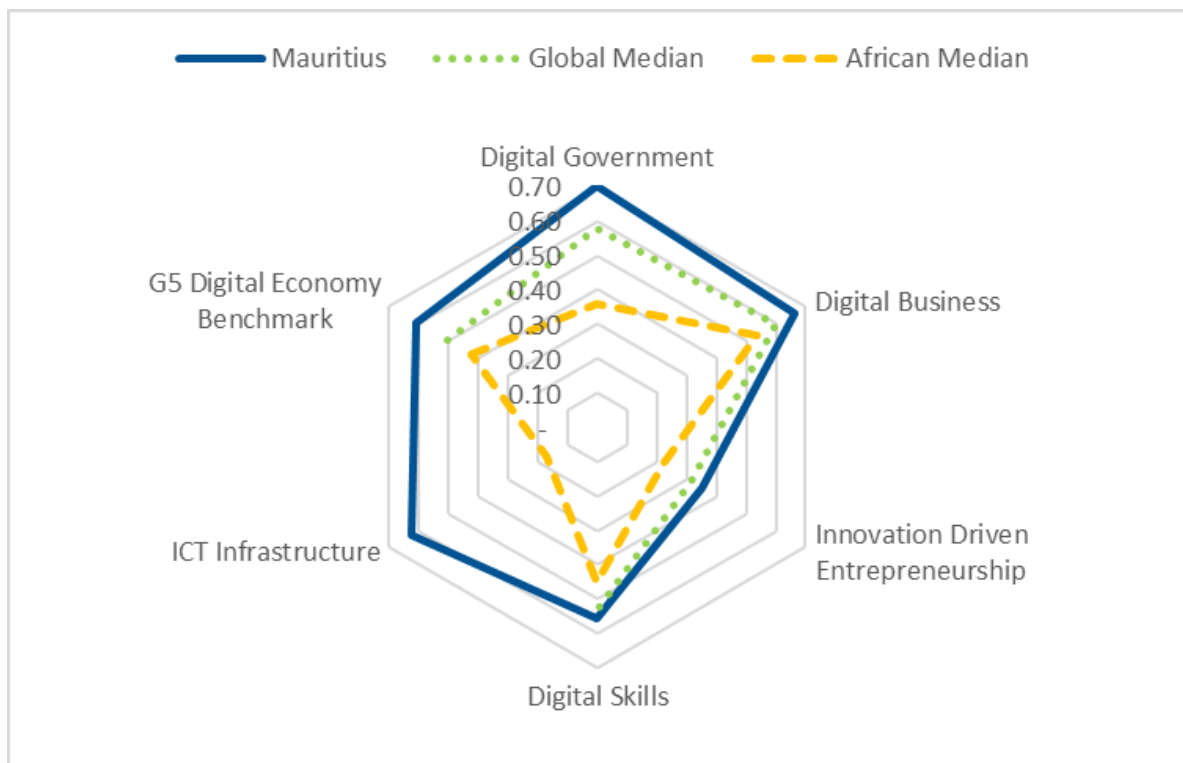

FIGURE 6 RESULTS FROM BENCHMARK ASSESSMENT FOR MAURITIUS

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Mauritius scored highly in all assessment areas. Table 5 below illustrates the ranking for each individual pillar where it ranks in the top two in all six 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	DRC
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	DRC		Angola	Malawi	Comoros
15	DRC	Angola			DRC	Mozambique
16	Comoros				Madagascar	Seychelles

DIGITAL INFRASTRUCTURE

In Mauritius, 58.6% of the total population uses the internet.[8] This average is much higher than the regional average of 29.94%. The GSMA Mobile Connectivity Index shows a 99% access to the 3G network,[9] which complements the HDI report of mobile cellular subscriptions at 151.4 per 100 people.[10] According to the Mobile Connectivity Index,[11] Mauritius is ranked 1st in terms of overall mobile connectivity in the SADC countries with an overall index of 65.8—which exceeds the qualification for it to be considered an emerging country (above 35). It scores above average for consumer readiness, affordability, availability of infrastructure, and content and services.[iii] In terms of ICT adoption, Mauritius ranks 49 (out of 140). The Mauritius government seems to be future orientated based on the position 49 (out of 140), but it scores lower on the innovation capability index as number 62 out of 140.[12] However, it scores high with 4.34 out of 7 points on the GCI 4.0 Digital Skills Among the Population Index,[13] which is one of the highest in the SADC region.

MAURITIUS AS A CYBER ISLAND

Mauritius embarked on 'becoming a Cyber-Island' at the turn of the century. It has continuously invested in its human capital and the ICT sector such that the ICT Sector has become the 3rd pillar of the Mauritian economy (five pillars: sugarcane; textiles and manufacturing; tourism and hospitality; financial services; and ICT). The country is well endowed in terms of ICT infrastructure, with almost unlimited optical fiber to the home connectivity or wireless broadband data connectivity being accessible in all parts of the island for around USD 25-30 per month. The country is the second, after South Africa, to have launched its 5G network.

Coincidentally over this period, Mauritius has been the phasing out of the ACP-EU Sugar Protocol. The agriculture sector which was largely based on Sugar Exports has diversified into the export of specialized sugars. The land on which sugar was grown, is being diverted to high value Real Estate to attract foreign investors and residents, Tourism, Smart-Cities and Finance and Technology Parks. Traditionally, just as the

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iii The enablers of mobile internet connectivity that inform the indicators selected for the Index are: 1. Infrastructure 2. Affordability 3. Consumer readiness 4. Content and Services

textile industry has had to resort to imported labor, the Agricultural sector has had to move towards mechanization which is facilitated by digitalization.

However, this transition has been rapid, and there exists a skills gap between the older labor force squeezed out of the sector and the gradual entry of young entrepreneurs into the sector. Furthermore, the tradition of sugar exports dominated the agricultural sector for many years, leaving the next generation in the agricultural sector to find a new foothold in the horticultural sector which has greater potential for a market in Mauritius. The Tourism sector provides a useful market for high end agricultural products, while Mauritius continues to import most of its staples. Therefore, Mauritius urgently needs to apply digitalization in the field of agriculture to promote high value products, automation, and increased productivity.

A new Agricultural Strategic Plan is under preparation, which will have to reflect the context of post-Covid re-launching of the economy. Nevertheless, an analysis of the prospects for the potential applications of digitalization that could have supported the achievement of the previous Agricultural Strategic Plan ([Strategic Plan (2016-2020) for The Food Crop, Livestock and Forestry Sectors](#)) would provide a useful basis for the development of a Digitalization Strategy for the Agricultural Sector in Mauritius.

2 THE BROADER POLICY ENVIRONMENT

In the benchmark assessment Mauritius ranked second out of 16 in the region, excelling in all indicators and appearing in the top two consistently. The high scores and ranking in the assessment pillars indicate that Mauritius is a front-runner in the region and suggests robust foundational requirements for a digital economy are in place, as well as a strong 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 Mauritius forms part of Group 1 which is made up of countries that scored highly in the benchmark, are generally less reliant on agriculture for GDP growth and employment and are some of the richest SADC 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 benchmark assessment suggested that Mauritius' digital economy is one of the most mature in the region, and this prioritization of digital transformation is clearly apparent when doing a stock take of available policies, strategies, and legislation.

POLICIES, STRATEGIES AND PLANS

Most of the government's ICT-related Policy documents are available from the website of the Ministry of Information Technology, Communication and Innovation, and related institutions.

The **National ICT Policy 2007-2011** and the **National ICT Strategy Plan 2011-2014** are some of the first documents to prioritize the importance of ICT and ICT-enabled development for Mauritius. In these initial documents, Mauritius already:

- Identifies that the ICT sector should be the fifth pillar of the economy and Mauritius to become a regional ICT hub.

- Focuses on strengthening the legal and regulatory framework to work across priority sectors while also identifying the importance of harmonizing with international norms and standards. Also, with a specific aim to be recognized by the European Community as a 'third country' on data protection. This is unique where others have focused on networks and devices for the general population.

- Infrastructure is a second priority focus and refers to setting up policies for Emerging Technologies which is very advanced for most of the region.

- Other focus areas include enhancing productivity and efficiency across economic sectors and SMEs, ICT in education, an overarching focus on cyber security, accelerating e-Governance, increasing use of ICTs across the population and better integration of ICTs in society, increase in skills, training and incubation in the ICT/ entrepreneur culture, and a focus on promoting ICT exports.

Both documents outline the clear aim for Mauritius to be a regional ICT hub and regional gateway to Africa. The benchmark assessment suggests that this objective has been prioritized as Mauritius scores highly against all indicators

Mauritius has also produced more specific strategies and policies that address some of the overarching ICT policy and plan's priority points. The **Open-Source Software Strategy for the Republic of Mauritius 2014** and the **National Open Data Policy 2017** both address the Open Data Initiative that Mauritius has embarked on to create economic value from the use of public datasets. This focus on open data is particularly novel within the region and is intended to stimulate innovation driven growth. Mauritius is the only country in the sixteen SADC countries to have an open data policy in place.

To foster trust in citizens and encourage private sector investment, Mauritius has implemented security policies through the **Anti-Corruption Policy 2015** and the **Cybercrime Strategy 2017-2019,** which build on the National ICT Plan's idea that Mauritius is to serve as a regional ICT hub and regional gateway. A strong regulatory and enforcement mechanism to ensure privacy and the effective prosecution of cybercrimes is paramount for the use of open data, and data-driven society that Mauritius is trying to achieve.

More recently and moving more into the "digital" age rather than ICTs, Mauritius released a few digital strategies: **Digital Mauritius 2030 Strategic Plan** sets out an updated overarching vision for the Mauritian economy and public sector, and the **Digital Government Transformation Strategy 2018-2022** focuses more on the implementation of this, particularly within e-government and public sector transformation. Digital Mauritius 2030 focuses on an innovative and sustainable public sector, while establishing an enabling environment for business facilitation. This enabling environment will be achieved through a focus of five "strategic waves" or priority areas:

1. ICT Infrastructure and Broadcasting,
2. E-Government and Business Facilitation,
3. Talent Management,
4. Cyber Security and Cyber Crime, and
5. Innovation and Emerging Technologies.

The Digital Mauritius 2030 Plan follows a similar template to our benchmark assessment and the Digital Economy Blueprint pillars identified by Kenya, except with a separate focus on cybercrime and security. Mauritius' introduction of Emerging Technologies is also unique and forward thinking for the SADC region and has quickly been incorporated in the policy environment with the release of a **Mauritius Artificial Intelligence Strategy 2018.**

It is encouraging to see strategies addressing several foundational pillars or priorities for an ICT or digital agenda and going beyond to incorporate emerging technologies. Mauritius scored highly on the benchmark assessment, presented in Chapter 1, and the proliferation of strategies and policies available are forward thinking. Digitalization has been fully embraced in the broader policy environment to achieve the goal for Mauritius to become a regional ICT hub.

2.2 LEGISLATION

Below are some key pieces of legislation relevant to digitalization for the study:

- The **Electronic Transactions Act 2000** provides regulation on electronic records, signatures, and contracts to foster e-commerce and provide secure and reliable electronic records recognized legally.

- The **Information and Communications Technologies Act 2001**, which established an authority, advisory council, and appeal tribunal to regulate and encourage fairness for operators. It also seeks to democratize access to information for citizens, ensure universal access and affordability to promote efficiency and competitiveness in the communications sectors.

- The **Computer Misuse and Cybercrime Act 2003** criminalizes several acts perpetrated through computer systems and provides procedures to be followed for the purpose of investigation. Mauritius became the first African country to accede to the Budapest Convention on Cybercrime in 2014.

- The **Data Protection Act 2017** strengthens the control and personal autonomy of data subjects over their personal data in line with international standards and establishes the Data Protection Office, the regulator. This legislature is compatible with the principles of the EU General Data Protection Regulations (GDPR).

- The **Mauritius Emerging Technologies Council Act 2021** is intended to work on the formulation of national policies and strategies in emerging technologies, promote the applications of these technologies throughout Mauritius, and facilitate the implementation of emerging technology solutions in Mauritius to boost the national economy.

The strategies, policies and legislation listed above provide a useful insight into how Mauritius has adapted to regulatory frameworks globally. Mauritius offers a good example of a national digital ecosystem that can support the application of digitalization in the agricultural system, with little investment required to operationalize such services.

2.3 DIGITALIZATION IN AGRICULTURE

DIGITAL IN AGRICULTURE POLICIES

There is no clear policy or strategy in Mauritius dedicated to prioritizing digitalization in agriculture. The **Strategic Plan for the Food Crop, Livestock and Forestry Sectors (2016-2020)** is the only document reviewed that had reference to ICTs in one paragraph with the phrase, "*ICT for effective agricultural knowledge management*". While the detail is limited, reference is made to the Food and Agricultural Research and Extension Institute offering ICT based services (such as SMS Alerts to registered growers), and focusing more on mobile technologies, information sharing platforms and e-learning. Reference is also made to "exploiting novel ICTs to enhance agricultural extension outreach/training/information" as part of the "improving

competitiveness" intervention. It is surprising that such little detail and specificity is provided within a strategy that is directed specifically at the agriculture sector, (and perhaps is reflective of its 3% contribution to GDP). A new Agricultural Strategic Plan is in development and is likely to contain references to a post-Covid-19 environment and greater emphasis on innovation in agriculture, particularly digital agricultural interventions.

Surprisingly, the **Mauritius Artificial Intelligence Strategy 2018** refers to Agriculture, including a whole section which outlines the rapid adoption of AI and Machine Learning in agricultural products and farming techniques. The Strategy acknowledges the threat of an aging labor force in the sector and the need for automation in production systems. Examples of potential applications of AI in Mauritius and companies involved in AI for agriculture are also included, although all these innovations are international operations. The strategy does provide a glimpse into a mindset shift and an acknowledgement by the Government that digitalization of the agricultural systems in Mauritius will improve productivity and attract a younger labor force that previously have not been as involved in the sector. However, a more robust and sector specific strategy or policy and plan would enable the management of risks and trade-offs that digital transformation may reveal.

CHALLENGES

An agricultural digital strategy would help to guide the direction of the sector, but agricultural stakeholders are unlikely to address some of the key challenges that remain. The digital literacy rate among the population is low, especially among farmers. If digital innovations are to be incorporated into the sector, especially ones that are more complex than SMS services, there needs to be a concerted and combined effort from relevant stakeholders to encourage uptake of digital solutions. From a public sector stakeholder interview, there is also an impression that digital use has not fully penetrated the work force, with most of the general population using digital technologies and services for social activities.

Limited funding and budgetary constraints are a challenge for the agriculture sector. However, greater partnerships with the private sector or farmers unions could unlock grants that could support digital transformation of the agriculture sector.

3 DIGITAL AGRICULTURAL INNOVATIONS

This chapter provides a stocktaking analysis to assess the numbers, scope, trends, and characteristics of digital agricultural innovations in Mauritius.

3.1 MAPPING THE DIGITAL AGRICULTURAL INNOVATIONS

The DACS for Mauritius presents use cases according to a typology and framework developed by GSMA (See Figure 1). 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 identified innovations in Mauritius.

A total of 21 innovations were identified in Mauritius that had a mix of use cases as illustrated in Figure 7 below. 13 identified innovations were operational in Mauritius and an additional eight were identified with a regional operational footprint with operating or registered activities in Mauritius.
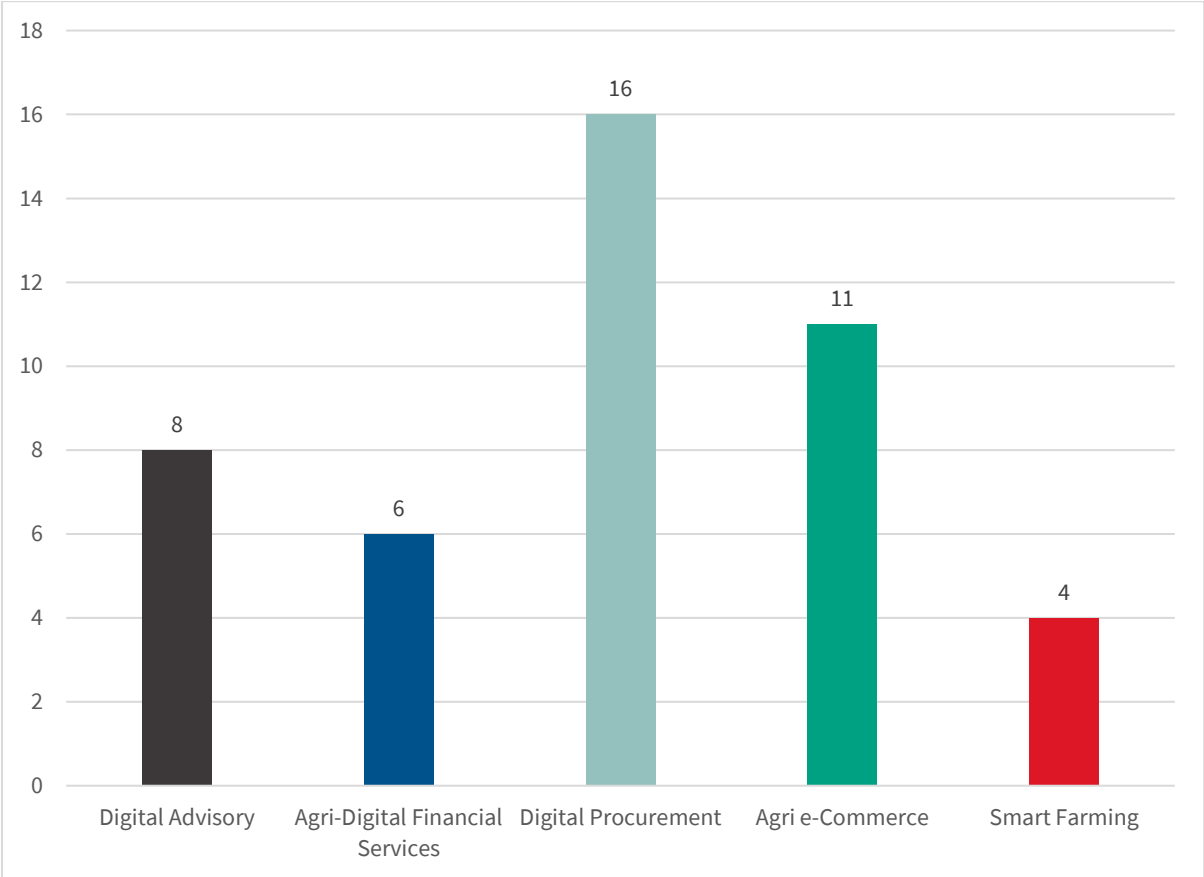

FIGURE 7 IDENTIFIED USE CASES FROM INNOVATIONS IN MAURITIUS

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 OPERATIONAL IN MAURITIUS

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 MAURITIUS

				Name of innovation	Name of the company	Survey ✓/X	Description of innovation	Operational Countries in SADC
■		▣	▣	APMIS	Food and Agricultural Research & Extension Institute (FAREI)	X	The Agricultural Production and Market Information System (APMIS) also developed by the Ministry of Agro Industry and implemented by FAREI (above) is an electronic resource for entrepreneurs, Producers, Traders, Input and Service Providers involved in agricultural production, agribusiness, and value addition. It provides pricing and market trends in the agriculture sector in a range of commodities, and research studies, resources, and facilities. It was created by the Ministry of Agro Industry and Food Security and is implemented and maintained by the Food and Agricultural Research and Extension Institute (FAREI). Current commodities include Garlic, Groundnuts, Brinjal and Aubergine varieties and pricing information for retail and wholesale for a range of crops such as Banana, Bean, Brinjal, Cabbage, Calabash, Carrot, Cauliflower, Chilies (large and small), Chouchou, Cucumber, Ladies Finger, Pawpaw and Pomme d'Amour. They have graded and ungraded produce and retail pricing including a very wide range of vegetables. The platform also presents input service providers by location cited including their contact details. In summary the portal was launched in 2010, has 57 listed crops, 3 retail and wholesale markets and 15 years of trends and statistics on areas under cultivation, business opportunities and local resources and facilities in Mauritius.	Mauritius

		■			EAN 128 & PMA SCANNING	Innodis Poultry Ltd	✓	Innodis Poultry Production Dashboard. Innodis is an agri e-commerce wholesaler and smart farming large-scale company which is using digitalization for its internal value chain processes to identify bottlenecks and monitor production. It is also a Poultry production company and is part of the Grocery and Related Product Merchant Wholesalers and was started and incorporated in 2015. From survey information this e-commerce platform seems to have been launched in 2020 and looking carefully at it is focused on imported livestock, seafood and fish, fruit and vegetables and cereals as well as dairy products etc. which are both fresh and frozen. There are many different enterprises and companies under the Innodis brand including importation, distribution, and warehousing facilities. They have 10 active users and 15 registered users. They require computers, basic and feature phones, and smartphones, including a website, dashboard, portal and use Excel and cloud-based software SQL. They are challenged with limited traceability, procuring from technology vendors, a lack of technical capacity and operational constraints. They address planning, storage, post-harvest processing, transport and access to markets and are transitioning to scale. The reason for its inclusion is that is has an internal dashboard adapted software from their Chick Supplier partner which enables them to monitor their chicken production platform, but this is at an early stage. They also recently won an award for COVID-response adaptation. (Their survey responses were focused on their e-commerce marketplace product).	Mauritius
		■	■		Emtel Cash	Emtel Ltd	✓	Emtel cash is an innovation from the Emtel Ltd company, a private company incorporated in Mauritius in 1987. It was the first mobile telephony operator and has now evolved into a one stop shop for ICT solutions including providing unlimited internet connectivity at the household level (Airbox) and the first 4G network in Mauritius. They also have invested in undersea Optical Fiber Cable, and this has come into service in 2021 (Emtel is the only operator in Mauritius to own capacity on all three submarine cables going out of Mauritius – LION, SAFE and METISS). Launched in 2015 the MNO based Emtel Cash enables storage,	Mauritius

						Description	Country
						transfer and receipt of money using a mobile phone through a digital and agri-wallet. The system has recently innovated to allow payments to be made to any other mobile phone, irrespective of the host mobile network provider. The initiative has played a role in changing payment habits from cash fueled by the pandemic and social distancing. The system uses SMS, USSD, Smartphone Apps. They use spreadsheets such as Excel and Cloud-based databases such as SQL. They service all parts of the value chain where payments are needed. They have 3,600 active users and 6,800 registered users and have grown through private financiers. They charge subscription rates and address poor access to markets for farmers and cashless payment systems solutions. They are faced with challenges such as digital literacy, access to device (sharing between friends and family), product development or translation into a local language for greater understanding by end users. Their technology is inclusive of women, youth, the elderly, and people with disabilities.	
	■	■	■		eShops	Multiple Internet Payment System (MIPS) ✓	This is a free commerce website with integrated payment solutions launched in 2020 which has a relationship with several online shops and thousands of users (visitors and customers) to increase the efficiency of selling products and receiving payments. Several of the operators on the local Food sector are hosted on the platform. This private company has 300 on-line shops (B2B) with thousands of users. They use cloud-based software as a service through third parties and address all parts of the value chain where payments are necessary. They charge transaction fees and deal with financial exclusion and cashless payment systems that are linked to banks. They have found understanding the market and user needs challenging as well as digital literacy, shared devices, and farmer uptake/use/behavior change. They believe their technology is inclusive.	Madagascar, Mauritius, Seychelles
■			■		FAREI Digital Repository	Food and Agricultural Research and Extension Institute (FAREI) ✓	The FAREI Website provides advisory on agricultural production and markets in general, publications on the key research agenda areas, agro processing information, promising potato varieties, on-farm trials, and information on potato cultivation as well as onion germplasm through e-newsletters. They also provide a video channel where farmers can learn	Mauritius

							about production system for different crops, biological control for key pests in Mauritius and dairy production. They provide severe weather forecasts warning. Digital innovation is mostly undertaken to support the farming community and stakeholders in agriculture. Since Mauritius is digitally well connected and farmers have access to internet and mobile device, the environment is conducive for innovation. Information, service provision and payment platforms are in the outreach of over 90% of users of the agricultural sector. Web and mobile application are easily accessed and used by most people in Mauritius. It has 3,500 active users and is a Public, Private Partnership Initiative.	
■	■	■	■	■	Farm City Agriculture entrepreneurs Hub	Farmcity	✓	A private sector social enterprise launched in 2020 providing digital advisory, agri e-commerce and an educational program for youth. The Agripreneur Hub where this is based has physical infrastructure to host young entrepreneurs on site and provides advisory support. They have a 9,500 m2 organic farm on site and open workspace and training facilities and incubate several different businesses including Ti Karo, Fish and Veggies and Oyas of Mauritius. They also have tenants and work with Partners including Beau Plan Aquaponics, ICHTHYS Aquaponics and Just Natural. All are working towards a sustainable food system. Farm City have 2 active users and 5 registered users and deals with agricultural advisory through Agri VAS, smart advisory and record keeping. It also provides crowdfunding, input financing and digital and agri wallets, digital records for digital solutions and input and output opportunities for e-commerce, as well as smart farm options with equipment monitoring. They use basic feature and smartphones, website and portal, social media platforms (Fb, Twitter) and messaging (WhatsApp and Messenger). They use Excel and SQL. They address low productivity, financial exclusion and poor access to markets and have been challenged by user affordability. They allege they are at sustainable scale, but the numbers do not bear this out and the agriculture entrepreneurs Hub that host them has struggled during Covid lockdowns. They charge individual subscription fees, transaction fees and are also dependent on donor subsidies. Farmcity has also innovated with the promotion and sale of	Mauritius

						urban agriculture kits through its online shop. The concept, which originated in Mauritius, has been upscaled and marketed in the Singapore branch of the Hub.	
		▢			Food Processing Software	Matrix Software	✓	Matrix Software is a meat and food matrix software solution for stock control, yield management, traceability, productivity, and cost margin management. Matrix Software is a service-led private company that provides software services predominantly to the livestock and meat industry and established in 2019. These are digital, mobile, and tablet-based systems for yield and stock control and statistics leading to costings and profitability. Matrix software utilizes android mobile scanners and their associated applications, RFID integrated solutions, automated weighers, and third-party integration. This reduces the initial capital outlays and good implementation support for feedlots, abattoirs, deboning plants, and meat processing plants including others such as fish, poultry, butcheries, and retail outlets. Matrix Software has been located/incubated in the AgVentures Hub in South Africa. This regional solution is deployed in 10 SADC countries (Botswana, Eswatini, Lesotho, Mauritius, Namibia, Seychelles, South Africa, Tanzania, Zambia, and Zimbabwe), but also in counties as Australia and New Zealand. Matrix Software solutions have reached a stage of replication and adaptation in other geographies and are in the Scaling state of development.	Botswana, Eswatini, Lesotho, Mauritius, Namibia, Seychelles, South Africa, Tanzania, Zambia, Zimbabwe
	▣				Fundkiss	Fundkiss Technologies Limited	✓	Fund Kiss is a crowdlending platform to enable Mauritian SMEs to borrow directly from individual and institutional investors through a Regulatory Sandbox License (RSL) from the Economic Development Board of Mauritius. In April 2021 with an official Peer-to-Peer lending license from the Financial Services Commission (FSC) of Mauritius, they are offering financing and good customer experience to their borrowers and their investors. They have funded 178 projects to date, some of the operators in the agriculture and food sector. Improve access to finance. Fundkiss provides unsecured loans that do not	Mauritius

							require collateral or personal guarantee. Services are offered through a website: provision of short-term financing for SMEs including agricultural operators.; Crowdfunding: Online platforms that enable investment in smallholders by sourcing funds from individuals (investors or sponsors) following a simple KYC process with an ID card and a Utility bill to start lending. The innovation deals with all parts of the value chain, and uses website, dashboard, and social media platforms. They use spreadsheets and have reached a level of sustainable scale with both a government grant and private funds. They have 252 active users and 2622 registered users. They address access to finance for SMEs with a good business plan but without collateral or personal guarantee. They have overcome challenges such as understanding the market and user needs, digital literacy, data collection and the financial sustainability of the business model. Their technology is inclusive of women.	
■		▧		■	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, 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	Angola, Botswana, Comoros, Democratic Republic of Congo, Eswatini, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Tanzania,

							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.	Zambia, Zimbabwe
■		▪	▪	▪	Greenery S	Freight Farms Inc	✓	Green Agro Farms - IoT Freight Farm System – imported precision agriculture system of Freight Farms Greenery Agro vertical hydroponic farm designed and built inside a shipping container with 320 square feet. This has a state-of-the-art controlled environment system with control of air, light, watering, spacing and management using the Greenery S integrated farmhand software which relies on IoT-connected sensors and auto-updating camera feeds for full visibility and transparency. The system has been used for 500+ crop varieties of leafy greens and provides an annual harvest of 2-4 tonnes. The farmhand shops provide everything necessary for a farming operation including tools, seed, grow plugs, nutrients, and cleaning supplies either as individual products or through a subscription service. The objective is targeted production of pesticide-free high value leafy greens available throughout out the year, independent of the season and requested by niche markets such as restaurants. Launched in Mauritius in 2020 it is a private agribusiness utilizing computers and sensors (weather stations, IoT) and uses smartphone App, website, dashboard all focused on farm production. They are transitioning to scale and have been financed by private sources. They have 300 users and produce pesticide free high-quality product for niche and premium markets using traditional markets. They have been challenged by raising capital for new imported technology products, procurement of technology vendors, and systematic factors in the operational environment such as regulations and the sustainability of the business model. Their technology is inclusive	Mauritius

						of women and youth but may be inaccessible for low-income farmers and low literacy audience.	
■		■			InfoHighway	Ministry of Information Technology, Communication and Innovation	✓	Info Highway is a secured infrastructure that shares information over the Government Intranet Network. The function is to provide the infrastructure for sharing of data amongst Government Agencies and is designed as the service platform, which allows multiple Government agencies to share data via E-Services to other agencies. The Info highway uses the publish and subscribe model whereby an agency willing to share data is the publisher and the one requesting data is the subscriber. Only the data that has been allowed to be shared can be transferred to the subscriber. Launched in 2016 it provides digital advisory through Agri-VAS on weather information and digital records enabling data sharing across organizations facilitating decision making. It utilizes computers and smartphones, a website, dashboard and portal and cloud-based databases and software. It has fond digital literacy, product translation into local languages for greater understanding challenging. It is focused on planning and inputs and is transitioning to scale. It has been financed by host country government funds and will remain dependent on this for some time.	Mauritius
		■			JuicePro	The Mauritius Commercial Bank Limited	✓	MCB-Juice is an innovation of the Mauritius Commercial Bank established as far back as 1838 with a single bank and now a Group with assets worth 16B $US and 60 branches or kiosks nationwide and active in Madagascar, Mozambique, Reunion Island Mayotte, Paris, Seychelles and the Maldives with a wide network of correspondent banks across the world. Launched in 2020 in Mauritius (and 2019 in the Seychelles), Juice is a mobile based banking system for businesses providing ready access to bank accounts and transactions. The Pro version enables multiple signatories to access and sign/approve as part of the workflow. Smartphone App is available on the App Store, Google Play and the	Madagascar, Mauritius, Seychelles

							AppGallery. Juice has 4,400 active users and 9,200 registered users and utilizes a subscription model. It is a private company at a sustainable scale in its development. It addresses financial exclusion, cashless payments, and has been challenged both by digital and financial literacy and sustainable business models but its technology is inclusive.	
■					MauCrop	The School of Innovative Technologies and Engineering of the University of Technology	✓	MauCrop developed by The School of Innovative Technologies and Engineering of the University of Technology. MauCrop: An AI-Driven Interactive Mobile Application to Advise on Crop Selection and Cultivation for Small-Scale Crop Farmers in Mauritius. Mobile application (MauCrop) to recommend on selection and sowing of crops, give weather information, also allow farmers to monitor their yield and expenses. This initiative was launched in 2021 and is still at the proof-of-concept phase. It relies on machine learning approaches to recommend the best crop to be planted based on the location of the plot to provide best yield. The innovation is through the public university, is involved with on farm planning and production is at the R&D stage funded by government. They are working through challenges such as data collection, farmer use, and behavior change as well as lack of mobile network coverage. Their technology is inclusive of women.	Mauritius
		▦	▪		Maupass	Ministry of Information Technology, Communication, and Innovation	✓	MauPass. This is the implementation of the National Authentication Framework which facilitates access to e-services offered by the Government of Mauritius trough the National Computer Board. The MauPass enables the user to log in once and have access to a series of services, some with the security of a two-factor authentication to ensure secure transactions. Some of the services enabled through MauPass involve making payments for government e-services. Launched in 2020 it has 5,000 active users and 37,000 registered users and deals with traceability especially agricultural inputs. Maupass provides a trusted mode of authentication which is critical for access to services. So, one of the facets of anticipated outcomes is improved access to finance. It uses	Mauritius

								computers and smartphones, an App and website including cloud-based databases and software dealing with financial exclusion and poor access to markets and planning, inputs and access to markets in the value chain. They have been challenged by understanding the market and user needs and digital literacy. They have reached a stage of wide scale adoption that is sustained. Supported by government grants they will remain dependent on these to provide the service.	
■		▪	▪		MoKaro	Food and Agricultural Research & Extension Institute	✓	MoKaro is an App developed (and hosted by FAREI (see above)) and launched in June 2019 is the first of its kind developed by the Ministry of Agri-Industry and Food Security and the Ministry of Technology, Communication, and Innovation in collaboration with the Food and Agricultural Research and Extension Institute (FAREI). It is a tool for farmers and planters to plan agricultural activities and manage their resources for maximum efficiency and minimizing losses. It provides advisory on planting, irrigation, field activities following crop analysis and assessment and farmers also receive information on climatic conditions in Mauritius, agricultural news and alerts. The tool also enables producers to communicate directly with suppliers of inputs such as fertilizers and pesticides. Another smart application is in the pipeline for the livestock sector. The App is available on Google Play here. Providing Agri-VAS, Smart advisory and record keeping, as well as agri e-commerce opportunities for sale of produce and outputs by farmers, improving farm productivity, incomes, and market efficiency. It utilizes computers, basic and feature phones, smartphones using SMS, the App, Website, and messaging platforms. It uses Excel and MS Access and has been challenged by understanding the market and user needs, procurement of technology vendors, in house technical capacity and farmer uptake. They also have challenges related to the regulatory environment and financial sustainability of the business model. They are still at the R&D Stage and reliant on public funding or donor grants. The innovation was developed with the input of government as well as social enterprises and	Mauritius

						entrepreneurs. They have been challenged with creating trust to convince farmers to change their way of doing things.	
		▪		MoKloud	Ministry of Information Technology, Communication and Innovation	✓	This is a government-hosted online space for a citizen to make sharable information, usually held by authoritative sources, about themselves accessible to others. Launched in 2021, it has 200 users to date. Once an authenticated user is on the platform, the user can request for government services and monitor the status of process of the request. Examples of requests that are already available include requesting for recent extracts of a birth certificate or marriage certificate. The documents are made available are genuine, time stamped information about the citizen. The certificates are created through a payment for services. Although not exclusively agricultural, these digital solutions are available to the agricultural community by enabling digital records to be produced with traceability.	Mauritius
▪	▪	▪		Mukuru App	Mukuru Africa	✓	Mukuru Money Transfer Limited is a private sector company operating regionally (Botswana, DRC, 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 customers (B2B) such as hotels,	Botswana, Democratic Republic of Congo, Eswatini, Lesotho, Malawi, Mauritius, Mozambique, South Africa, Tanzania, Zimbabwe

							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.	
	■				MyTMoney	Mauritius Telecom	✓	MyTMoney is an innovation from Mauritius Telecom incorporated in 1998, and in 1996 they have two fully owned subsidiaries Cellplus Mobile Communications and Telecom Plus Limited to offer mobile and internet services respectively. In 2000 France Telecom (now called Orange S.A.) acquired 40%share of the company. The company has a customer base of 1.3M subscribers and has made a successful transition from a state-owned entity to a fully private company. They offer high speed greater bandwidth. Their international network operates vis optical submarine cable SAFE/SAT3 through South Africa to Europe, LION/LION2 EASSY – EIG to Europe and SAFE to India and Malaysia. They provide fixed line, mobile, internet, TV and mobile money services, all their products and services were regrouped under a single commercial brand my.t. Mobile Operator based wallet to store, send & receive money using your mobile phone aiming to change the payment habits by cash specially to avoid contact during pandemic; operator has established linkages to most commercial banks in the country and offers a payment card as well to accompany mobile payment. Existing wide network of merchants to clients. Potentially a model for democratizing mobile payments from peer to peer. The My.t wallet launched in 2019, is a fast payment service with a My.t money card, or using one's smartphone, utility bills can also be paid, and money transferred digitally, bills can be shared a up to four subaccounts can be added. This wallet can be linked to a bank account, and cash received from the bank account, cash can also be received with a my.t money card or a QR code, transactions can be viewed. For businesses and	Mauritius

					merchants, they can receive point of sales devices to accept payments and track sales with instant SMS notifications for all transactions. A number of marketing relationships have been established offering deals such as for the University of Mauritius offering special payment offers for students, or retail and food outlets. The widespread accessibility of the My.t payment system, which is operated by an MNO linked to a set of banks shows potential for registration of small-scale agricultural producers onto an electronic payment system. The service is MNO based and delivered through Smartphone App using local databases such as MS Access and addressing all parts of the value chain where payment transactions are needed. They have 200,000 active users and 300,000 registered users. They charge a subscription model and address financial exclusion, cashless payment, payment system linked to banks and provide a mobile/payment card combination for transactions. They also struggle with digital literacy, sharing of devices, and the use of local languages but believe their technology is inclusive of all disadvantaged groups.	
		▪	▪		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

■	▨	■		QuickPay	Multiple Internet Payment System (MIPS)	✓	Quick Pay System of Multiple Internet Payment System (MIPS) is a private sector fintech payment ecosystem established in 2019 which is compatible with third parties, shops and enables a quick pay system by allowing businesses to create a payment ticket and send a link, when the link is clicked, then a payment can be made by a card. This aspect includes digital and agri wallets and an accountability tool and enables acquisition of inputs and outputs as a sub use case. This is a free hosted e-commerce website with integrated payment solution towards increased efficiency for selling and receiving payments.	Madagascar, Mauritius, Seychelles
			■	Smart Solutions for Agriculture by HMT	Harel Mallac Technologies (HMT)	✓	Smart Solutions for Agriculture by Harel Mallac Technologies (HMT). Rapidly emerging technologies that capture, manage, communicate, and use information in digital form are dramatically transforming the way that farming and agribusiness are done across the globe, especially for large commercial farms. Through the Mauritius Research and Innovation Council (MRIC), Harel Mallac Technologies (HMT) has developed an AgriTech platform to unleash the power of IOT and AI for farmers thus accelerating the development of its innovative business solutions in the agriculture sector. The platform supports IoT enabled systems to monitor critical parameters like water content and NPK in the soil medium, automate irrigation and fertilization whilst considering weather forecasts, and monitoring intrusion in real time. The AgriTech platform is powered by an intelligent engine able to forecast yield of the cultivations by consolidating live and statistical data. The platform was launched in 2020. The platform uses computers, sensors (weather stations, IoT of things devices, website, dashboard, Portal RaWAN network. Smartphones and websites are being sued and cloud-based software as a service. The initiative deals with planning and on-farm production. It is currently at the proof-of-concept phase but aiming to start commercializing and has receive a government grant and committed internal resources. They charge individual subscriptions and business subscription fees and have currently piloted with 5 users. The equipment monitoring involves irrigation to enable farmers to	Madagascar, Mauritius

| | | | | | | | remotely control and track and maintain equipment for farming operations and leads to a reduction in water consumption and waste. They have awaited approval by the ICTA regulatory body of the frequency allowed since their sensors are LoRa (long range, low power wireless based). They have also been challenged in understanding the market and user needs. Procurement of vendors has been challenging as is user affordability, internal technical capacity, and data collection. Farmer uptake and behavior change remain challenges. The technology is believed to be inclusive of women. | |

3.3 RESULTS FROM INNOVATION SURVEY RESPONDENTS

All identified innovators received a survey and 18 innovations implemented in Mauritius responded. The answers on the survey are self-reported. Of the innovations identified, 11 were operational in Mauritius only and the remaining seven operated in multiple countries. All identified innovators were reminded several times by email and by phone to complete the survey. The response rate of the survey for Mauritius was 86% (18 out 21 identified innovations responded).

USE CASES AND SUB USE CASES

The division of GSMA use cases shows that in Mauritius multiple use cases are most common. 10 out of 18 respondents provided multiple services and only eight respondents provided a single use case. One respondent addresses all 5 use cases in their innovation, one address 4 use cases, four address 3 use cases and four addressed 2 use cases.

Figure 8 below provides the division of use cases. Digital procurement was the most common use case cited by 13 survey respondents, followed by agri e-commerce (8). Smart Farming was only mentioned by four respondents. Figure 8 also illustrates a comparison of use cases to the rest of the identified innovations in the SADC region.
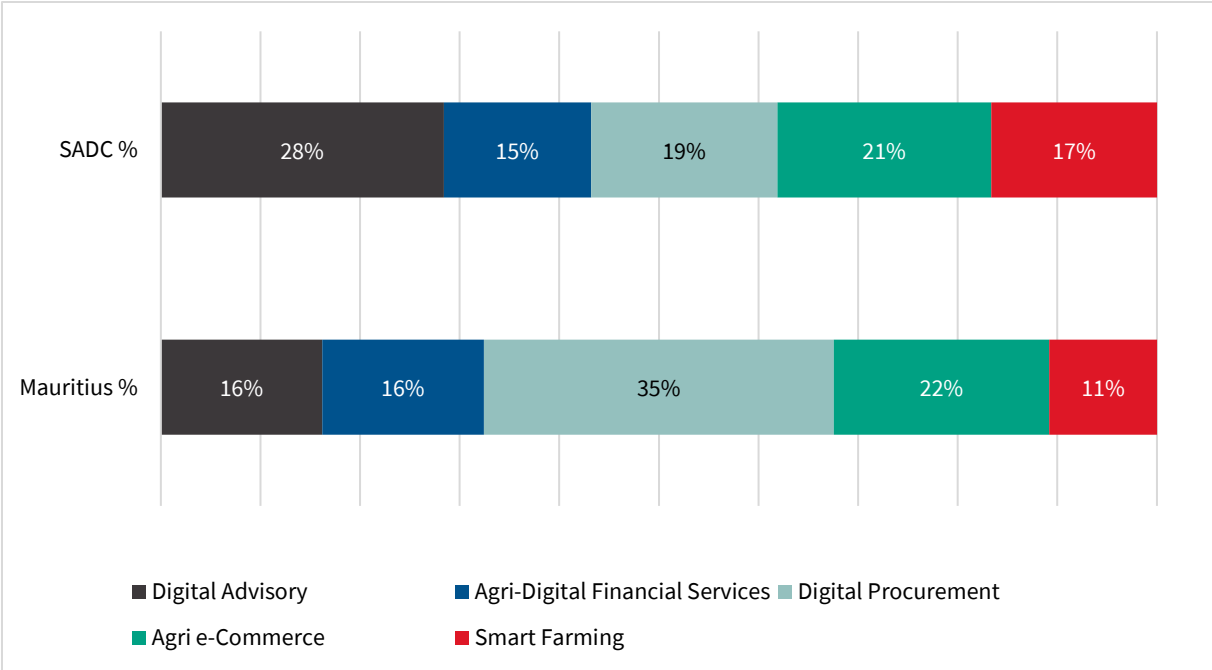
FIGURE 8 DIVISION OF USE CASES FOR SURVEY RESPONDENTS IN MAURITIUS VS. IDENTIFIED INNOVATIONS IN SADC

Most services were launched in 2020 (5), 2019 (4) and 2021/2015 (2 each in respective years), with the remainder launched between 2014 and 2018. One was launched in 2002. The innovations are predominantly private sector initiatives (12) followed by Government (3).

The innovations present in Mauritius cover almost all sub use cases as presented in figure 9 below. These innovations include digital procurement solutions and digitizing transactions and records across the

agricultural value chain and agri e-commerce in higher numbers than those related to digital advisory. This is followed by digital financial services and smart farming.
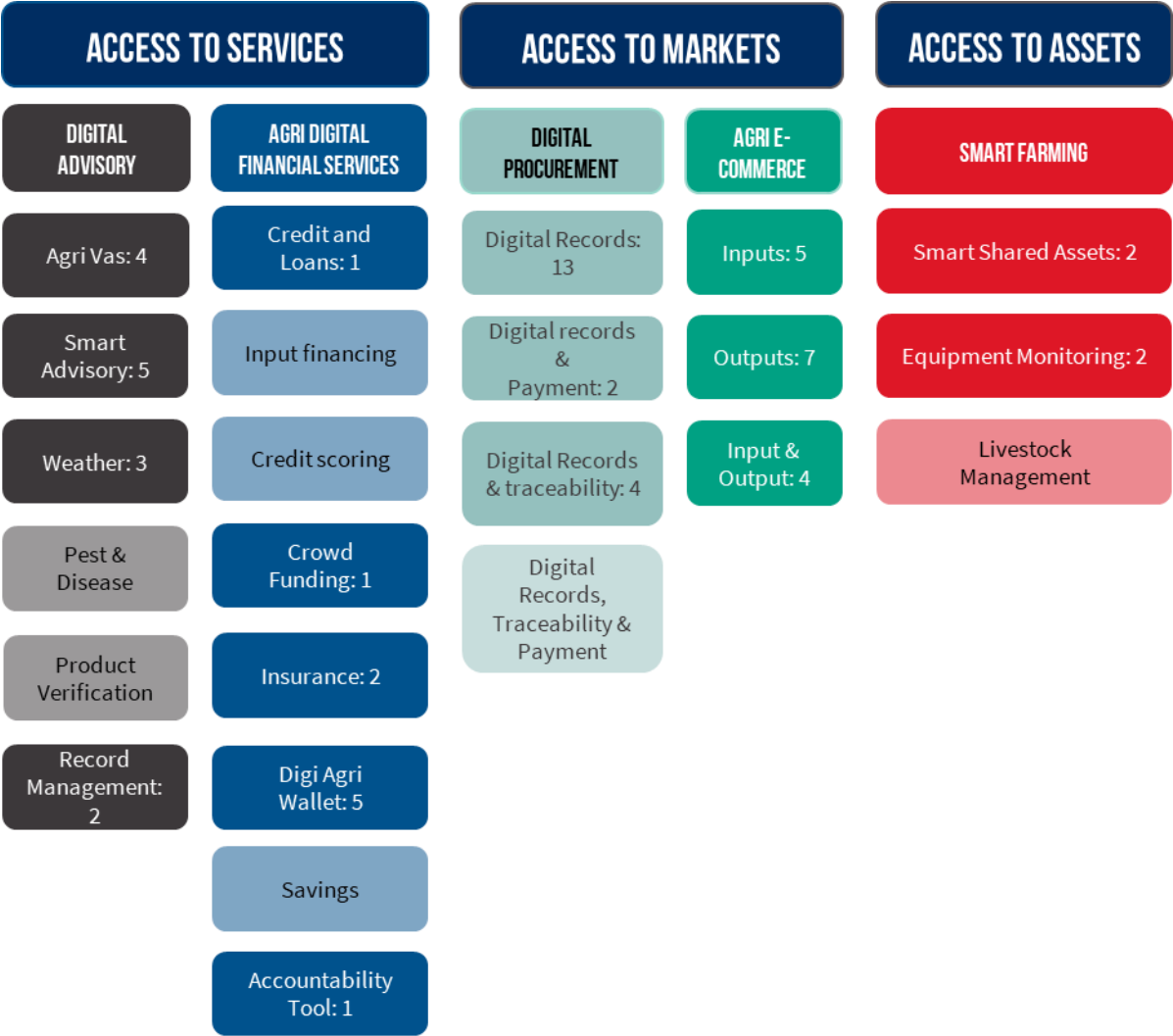

ACCESS TO SERVICES		ACCESS TO MARKETS		ACCESS TO ASSETS
DIGITAL ADVISORY	**AGRI DIGITAL FINANCIAL SERVICES**	**DIGITAL PROCUREMENT**	**AGRI E-COMMERCE**	**SMART FARMING**
Agri Vas: 4	Credit and Loans: 1	Digital Records: 13	Inputs: 5	Smart Shared Assets: 2
Smart Advisory: 5	Input financing	Digital records & Payment: 2	Outputs: 7	Equipment Monitoring: 2
Weather: 3	Credit scoring	Digital Records & traceability: 4	Input & Output: 4	Livestock Management
Pest & Disease	Crowd Funding: 1	Digital Records, Traceability & Payment		
Product Verification	Insurance: 2			
Record Management: 2	Digi Agri Wallet: 5			
	Savings			
	Accountability Tool: 1			

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

CHALLENGES

The survey respondents were asked to describe their biggest challenges. By far the biggest challenge in the application of technology is digital literacy in Mauritius (8) followed by the challenges of a financially sustainable business model or revenue stream (6) followed by understanding the market and user needs (5) and farmer uptake and behavior change (4). Other angles mentioned included the challenge of procuring technology vendors (with the right specialist experience), operational constraints and lack of technical capacity as well as user affordability, and at a modest level mobile network coverage.

TECHNOLOGY USE AND CHANNELS

Most innovations require Smartphones (11) or Computers (9) and utilize Websites (12) or Smartphone Apps (9). Some include sensors and geo data such as weather or satellite information. For analysis tools and technologies, respondents provided a mix of examples. Spreadsheets (10) were most popular to analyze data, followed by cloud-based databases and software (8, respectively). AI platforms and machine learning were also mentioned.

Digital Agriculture Country Study Annex | **Mauritius**

VALUE CHAIN PHASES COVERED

Most innovations in Mauritius address poor access to markets for farmers or low productivity (7, respectively), and financial exclusion or climate change (6, respectively). Some also address knowledge gaps for farmers. The innovations address planning and access to markets mostly, with on farm production, input acquisition, and post-harvest processing.
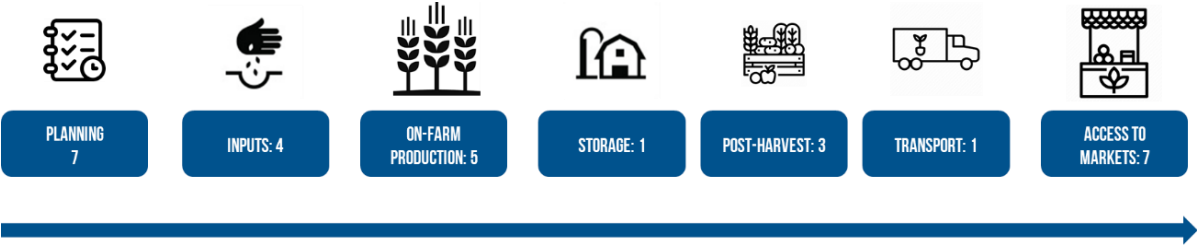

| PLANNING 7 | INPUTS: 4 | ON-FARM PRODUCTION: 5 | STORAGE: 1 | POST-HARVEST: 3 | TRANSPORT: 1 | ACCESS TO MARKETS: 7 |

FIGURE 10 SURVEYED INNOVATIONS PRESENCE IN THE VALUE CHAIN IN MAURITIUS

SCALING

Most digital innovations in Mauritius are in later stages of scaling according to the Insights on Scaling Innovation report[17]. Of the respondents, 51% are at a sustainable level of scale and are experiencing wide scale adoption, 31% are transitioning to scale and 12% are either replicating, adapting, or at the R&D stage respectively. Only 6% are at a proof of concept or piloting stage. Many are charging transaction fees or business subscription fees or are subsidized by national government bodies or donor agencies.
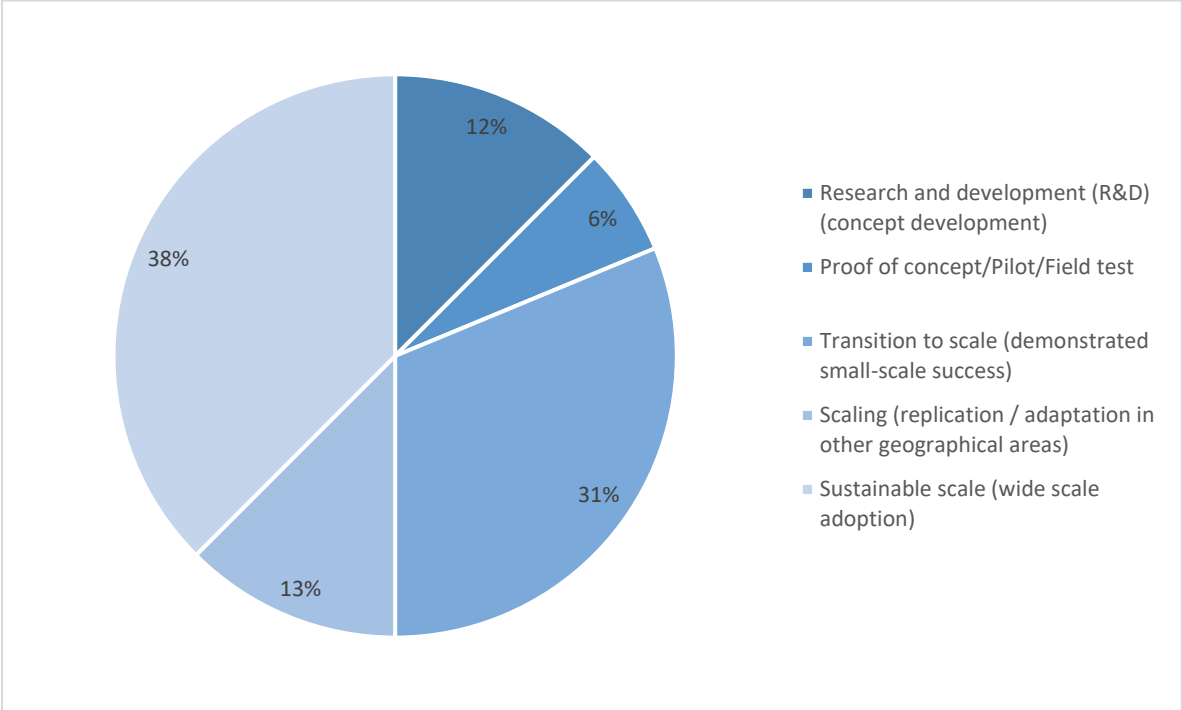

- Research and development (R&D) (concept development)
- Proof of concept/Pilot/Field test
- Transition to scale (demonstrated small-scale success)
- Scaling (replication / adaptation in other geographical areas)
- Sustainable scale (wide scale adoption)

FIGURE 11 SCALING STAGES FROM SURVEYED INNOVATIONS IN MAURITIUS

FINANCE

Sources of funding are mixed in Mauritius. Business development support and donor grants were the most common (cited by 6, respectively), followed by friends and family (4). Impact investors, crowdfunding, training, and self-funding were all mentioned twice. When asked if any subsidies or donor support would be

required to sustain the innovation nine responded no, two were unsure, and five said yes. The five that would require further funding were all operational in Mauritius only.

INCLUSIVITY

Most of the innovations were reported to be inclusive of underrepresented groups such as women, the elderly, disabled and smallholder farmers of lower language literacy. While, most suggested that the technology, they used to be inclusive of women, most had not taken explicit approaches to target poor farmers, or those with limited literacy (4) or the elderly (4) or women (3). A very small proportion had made explicit efforts to ensure their technology was inclusive.

4 DIGITAL AGRICULTURAL SYLLABI AND ENTREPRENEURSHIP TRAINING

The National Information and Communication Technology Strategic Plan (NICTSP) 2011-2014, targets the issue of increasing digital literacy in primary and secondary schools. Furthermore, it acknowledges the need of improving the quality of university level courses in software development and information systems engineering to ensure graduates' inclusion into the job market. The Mauritius AI Strategy (2018) focuses explicitly on the potentials of AI for development and economic growth, also in the agricultural sector. Skills development is one important part of this strategy, and the country envisions to strengthen AI trainings in tertiary education.

In the Digital Mauritius 2030 Strategic Plan, the government names digitalization and ICT as the leading economic pillar to make all existing sectors prosperous in the future. Digital transformation is the necessary condition for the country's growth and competitiveness. Its strategy of talent management includes the following points, among others:

- Provide scholarship schemes in emerging technologies to support students.
- Adopt the right mix of financing instruments for training of human resources in ICT field
- Organize trainings in collaboration with universities and polytechnics
- Introduce ICT training incentive schemes for employees, integrate work placements/internships in ICT courses at tertiary levels and ICT skills exchange programs with international organizations.
- Ensure that teaching programs are enhanced to satisfy the needs of the industry; Create shorter learning modules that foster continued learning for employees, recognize and promote on-the-job training opportunities and maximize informal learning opportunities.
- Ensure that digital and data literacy as well as critical thinking, problem solving courses are integrated in the educational curriculum.

4.1 AGRICULTURAL SYLLABI UNIVERSITIES

One Agricultural University in Mauritius was invited to complete the survey: The University of Mauritius which also participated in a KII.

UNIVERSITY OF MAURITIUS

FACULTY OF AGRICULTURE

Since 2000, the University of Mauritius's Faculty of Agriculture has offered various on site and online digital training courses. The digital training courses implemented were not delivered at certificate level. Thirteen were delivered at BSc level, 13 at MSc level, and nine PhD level. Eight were delivered at a college incubator level and 8 at the university incubator. As for digital agriculture, two courses are delivered at B.Sc. level and five at M.Sc. level. These courses are offered as short courses through projects and joint faculty collaboration with the Faculty of Information, Communication and Digital Technologies (FoICDT). All courses in digital agriculture are taught on site. The University of Mauritius is also providing entrepreneurship training for digital businesses in the following fields: digital procurement, e-extension, smart farming, ICT-enabled advisory services, digital content creation and Technologies in Sheltered Farming. These trainings will equip students with the necessary skills to launch an enterprise, to work as an employee, for the public sector or in advanced research. For the Faculty, equipped young people in data collection, digital advisory, agri digital financial

services, agri-e-commerce, e-Extension, and smart farming will facilitate their insertion into Malawi's current agriculture sector labor market. University or college incubator / Innovation spaces and experimental farms are considered qualitatively as important facilities by DSTI for digital training.

COMPLEMENTARY QUALITATIVE INFORMATION - UNIVERSITY OF MAURITIUS - FACULTY OF AGRICULTURE

The Covid-19 pandemic has accelerated the use of digital technologies at the University of Mauritius for teaching purposes. The university has good digital infrastructure and provides computer laboratories for students. WIFI hotspots are available in strategic locations on the campus but there is a need to upgrade the bandwidth. All full-time academics of the faculty are equipped with either a laptop or a desktop computer. The classes and laboratories are fully equipped with audio visual facilities for lectures and presentations. The University of Mauritius provides all students with a training in general IT skills. Furthermore, students receive specialized digital trainings, depending on their program of studies, e.g., data collection and analysis, programming and coding. Additionally, most students cover aspects of Agri-e-commerce and Smart Farming in their program of studies.

Until recently, the university did not teach digital agricultural skills separately, but used to integrate some components of digitization (e.g., use of sensors, IoT) in the crop and animal production modules. Currently, one new B.Sc. and a new M.Sc. course are teaching skills in digital agriculture in specific modules.

The Faculty of Agriculture collaborates with the staff of the Faculty of Information, Communication and Digital Technologies (FoICDT) in various projects. At the Faculty of Agriculture, there exists an Agricultural Economics and Entrepreneurship unit which teaches modules on entrepreneurship and business management in undergraduate courses. All students are exposed to general entrepreneurial trainings in their program of studies. Furthermore, the faculty runs a postgraduate program of studies in Agribusiness. In March 2020, the University of Mauritius launched the AgriTECH Park, with the aim to offer a platform for collaboration between Academia, the Industry, Corporate sector/SMEs, Start-ups and Incubators, and supportive of entrepreneurs in the development of innovative products and services for the Agri-Food sector in the Republic of Mauritius and in the region. The university has also started implementing multidisciplinary and transdisciplinary projects within the DeSIRA initiative, developed by the European Union (EU), in the field of Smart Agriculture and Artificial Intelligence. The University of Mauritius collaborates with several international universities on digital agricultural skills development in teaching and research, for example, the Cergy Paris University in France. Prospectively, the University of Mauritius could develop joint collaborative projects and the delivery of modules from other Universities in the country, such as the University of Technology Mauritius (UTM) and the Universite des Mascareignes (UDM).

TABLE 7 OVERVIEW OF RESPONSES FROM SURVEYED UNIVERSITIES IN MAURITIUS

MAURITIUS UNIVERSITIES	
University of Mauritius (Faculty of Agriculture)	
Digital Agri Skills	Big Data for analytics in agriculture Artificial Intelligence for agriculture Internet of Things for Agriculture Programming / Coding for agricultural systems Digital entrepreneurship in agriculture Cyber security in the agricultural context
Digital training courses updated	Yes
Digital entrepreneurship trainings	Agri Digital Financial services Agri-e-commerce E-extension Smart Farming ICT-enabled advisory services Digital Content Creation

	Technologies in Sheltered Farming
Type of Skills building	Launching an enterprise Finding a job as an employee Working for the public sector Working in advancing research (PhD, research institutions, etc.)
Most important digital Agri skills	Data collection Digital Advisory Agri Digital Financial services Agri-e-commerce E-extension Smart Farming
Most important facility for digital trainings	University or College Incubator/Innovation Space Experimental Farms
Aligned with institutional strategy	Digital Strategic Plan 2030 Mauritius Artificial Intelligence Strategic Plan.

4.2 INCUBATORS AND INNOVATION HUBS

A total of 5 business support organizations have been mapped in the country, out of which 3 are operating in the agricultural sector.

The general business support organizations without focus or activity in the agricultural sector that have been identified are Mauritius Start-up Incubator and Turbine. For these organizations we did not find evidence of trainings and incubation activities dedicated to agriculture entrepreneurs and they were not targeted for the KIIs.

The agriculture-related business support organizations that have been identified and contacted are:

- Regeneration Mauritius
- Farmcity
- SME Mauritius

These organizations support entrepreneurs and youth in Mauritius to build their digital and entrepreneurial capacities and skills in the agricultural sector. A total of **two** business support organizations responded to our request and took part in KIIs.

FARMCITY

Farmcity's Agriculture Entrepreneurs' Hub and learning farm was established in 2016. Farmcity provides mentorship and managerial support to local entrepreneurs during their incubation periods. The Hub provides some land where the entrepreneurs can test their ideas on small scale facilities such as a co-working space, internet, a training center, and water distribution on the site. Additionally, Farmcity accompanies the entrepreneurs in the promotion and establishment of their products on the market, for example via Farmcity's social media platforms. To date, Farmcity has supported six agriculture entrepreneurs in the following fields: aquaponic design for urban farming, development of a self-irrigated bed with a protective net, production of

bio-mushroom, starting of microgreens, planting in a clay pot irrigation system, establishment of an IoT-based greenhouse farming system.

Farmcity's Agriculture entrepreneurs' Hub does not offer formal training or specific digital trainings for entrepreneurs but uses an informal peer-to-peer approach. Regarding digital agriculture, they use the tool of digital advisory to provide information on technologies, inputs and outputs to use and their procurement, as well as information on Pest and Disease control. For their program, they target young agriculture entrepreneurs and aspiring entrepreneurs with innovative and novel ideas related to agriculture. The Hub does not collaborate with any university or college.

Farmcity does not receive the support from the government, but relies on their own capital, sponsors, donors, and crowdfunding. They have also received grants from the private sector.

SME MAURITIUS

Established in 2017, SME Mauritius is a private company fully owned by the government of Mauritius. It was established under the SME Act 2017. The main function of SME Mauritius is to support aspiring as well as existing entrepreneurs to start, develop and maintain sustainable business models. It serves as a training center, an incubator/accelerator and a business facilitator. SME Mauritius supports start-ups through the Start-Up Program where participants are given free coaching, mentoring and co-working space to develop a solid business plan and acquire specific skills needed by entrepreneurs. This program is open for any field of activity ranging from farming, manufacturing, and the service sector. SME Mauritius has supported countless number of entrepreneurs and start-ups in the agricultural sector through the Connection Assistance Scheme which allows them to get access to new utility supplies. 10% of the total scheme disbursed by SME Mauritius in the financial year 2021-2021 was in the agricultural sector. The start-ups in the agricultural sector are either involved in farming, hydroponic production, vegetable growing, aquaponics and poultry production.

SME Mauritius targets young agriculture entrepreneurs and aspiring agriculture entrepreneurs for its trainings in digital agriculture, ICTs/digitalization, and entrepreneurship. More particularly, they deliver trainings in new technological tools and services available in agriculture and other emerging economies, digital marketing workshops with the collaboration of external stakeholders and workshops on the use of modern technologies for SMEs in the agricultural sectors. Regarding digital agriculture trainings, they are now starting to explore digital agriculture tools through a series of workshops, but this topic is not integrated yet in their curricula. All digital trainings are delivered in collaboration with external organizations and during workshops sometimes also with the entrepreneurs themselves who share their knowledge and experiences. SME Mauritius collaborates with the University of Mauritius. SME Mauritius is funded by the government and does not receive funds from the private sector.

TABLE 8 OVERVIEW OF RESPONSES FROM INTERVIEWED INCUBATORS IN MAURITIUS

MAURITIUS INCUBATORS	
Farmcity	
Year of Establishment	2016
Agri start-ups incubated	5
Target of Digital Agri trainings	Young agriculture entrepreneurs
Digital Skills trainings	On demand (e.g., IOT Training)
Digital Agri Tools taught	Digital advisory
Collaboration with Universities and Colleges	No
Supported by the Government?	No
SME Mauritius	

Year of Establishment	2017
Agri start-ups incubated	N/A
Target of Digital Agri trainings	Young agriculture entrepreneurs Aspiring agriculture entrepreneurs
Digital Skills trainings	Digital marketing workshops Modern technologies for SMEs in the agricultural sectors
Digital Agri Tools taught	None
Collaboration with Universities and Colleges	University of Mauritius
Supported by the Government?	Yes

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

5.1 INSIGHTS

BENCHMARK RESULTS

Mauritius ranked second out of 16 in the benchmark assessment which suggests that it has a robust and mature digital economy which could provide guidance on some best practices. 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. Mauritius scored consistently in the top two ranking of all six assessment pillars and surpasses the African and Global median for all. Mauritius ranked first in digital business (which identifies the development of a robust marketplace for digital trade, digital financial services, and digital content) and innovation driven entrepreneurship (which identifies 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).

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. Mauritius makes up part of Group 1, as it is a front-runner in the region for unlocking a digital economy. Countries that make up part of Group 1 have been the most successful to date at advancing their policy and enabling environments and all have agriculture sectors contributing less than 10% of GDP, and which employ less than 5% of their population in productive agriculture. There may be many more people engaged in the food system itself including retail, processing, trade, storage, logistics, marketing, and food preparation. These front-runners provide good areas of potential learning in certain foundational pillars necessary for a vibrant digital economy. Specific focus and investigation should be made to understand what is working within these countries in the implementation of their policies and legislation, how it is working, and the levels of enforcement with regards to the policy, regulatory and legal frameworks.

The benchmark illustrates the variation in the strengths and weaknesses across the region. Some caution is also necessary given the complexity of these themes because a strong candidate such as Mauritius, which excels in the ranking and is identified as advanced even at a global level, is still unproven because it is at an earlier stage in developing its agriculture sector to build greater self-sufficiency in its national food system.

POLICY ENVIRONMENT

Mauritius has a well-developed policy and regulatory environment for ICTs. Additions of specific data and security policies are most encouraging, especially as these are harmonized already with international standards. Generally, Mauritius' strategy is a good example of best practices for digital transformation. The Government has encouraged and enabled digital acceleration to position Mauritius as an ICT hub for the

region. However, more attention on tangible innovations and enhancements within the agriculture sector is necessary to stimulate productivity, such as greater digital advisory tools to reduce the knowledge gap. The Ministry of Agriculture and the agriculture sector are in the early stages of shifting to digital innovative technologies. However, while the sector itself may still be in the early stages, Mauritius has a solid foundation and linkages to other important elements for agricultural innovations, namely e-commerce and financial services.

Mauritius has also created policy instruments supporting the shift to sustainable consumption and production and a broadband plan which includes the promotion and provision of broadband services to women and girls, persons with disabilities and for youth in particular, which is commendable. It has also utilized sandbox licenses to minimalize the legislative burden of driving financial inclusion.

DIGITAL AGRICULTURE INNOVATIONS

This study identified a total of 21 innovations with 13 innovations that were either digital agricultural innovations or digital innovations serving a predominantly rural and farming population in Mauritius and eight regional digital innovations operating or registered in Mauritius. There is recognition from across Africa that registering IP and a business in Mauritius provides opportunities for a more encouraging start up SME climate including taxation and VAT regimes and improved access to finance for growth. Furthermore, the opportunity to register and grow businesses in Mauritius particularly in AgriTech and expand operations to other African countries is a route already being pursued by some innovations.

The most popular AgriTech use cases in Mauritius include solutions in digital procurement followed by Agri e-commerce, digital advisory, digital financial services (not exclusively agricultural but serving as the agricultural sector stakeholders) and smart farming. Most innovations in Mauritius are addressing poor access to markets for farmers, and low productivity, or financial exclusion. Some are addressing climate change aspects and knowledge gaps for farmers. The innovations address planning and access to markets mostly, with on farm production, input acquisition and post-harvest processing. By far the biggest challenge in the application of technology is digital literacy followed by the challenges of a financially sustainable business model or revenue stream, understanding the market and user needs, and farmer uptake and behavior change. Other aspects mentioned procurement of technology vendors, operational constraints, and lack of technical capacity as well as user affordability and at a modest level mobile network coverage.

DIGITAL AGRICULTURAL SYLLABI AND ENTREPRENEURSHIP TRAINING

In Mauritius, the use of intelligent solutions for agribusiness is important to move towards more sustainable and resilient systems in the face of climate change. The University of Mauritius integrated the teaching of digital skills and of digital agricultural skills into its syllabi. They possess digital infrastructure but there is a need to boost WIFI and to raise the number of hotspots on campus. The university needs support to keep pace and seize the opportunities of the digital age to educate agricultural graduates that are conversant with these emerging digital trends. Resources and budgets must be made available to support the university in implementation of digital skills trainings, especially regarding the training in high-end agricultural and digital technologies. Furthermore, an assessment of the needs of farmers in Mauritius should be conducted. With these results, the university may develop more focused and adapted training modules in digital agriculture.

For the incubators and university interviewed, CCARDESA and other partners can better support the development of digital skills for youth agricultural entrepreneurship in SADC by establishing partnerships between universities and leading training institutions/business support organizations in digital agriculture to promote mutual learning; develop a website with successful case studies of digitalization of agriculture; facilitate access of materials to support skills for both students and teachers in e-learning and digitalization of

agriculture; and disseminate knowledge on latest technologies and creation of modern laboratories for new technologies and research to promote development and innovation in the agricultural sector.

5.2 REFLECTIONS FROM THE SITUATIONAL ANALYSIS REPORT

This document has presented the available data collected for Mauritius 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 Mauritius 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.** In addition, the sector specific strategy – and most particularly for agriculture - would need to be adapted to leave no one behind especially those at greatest risk of exclusion. While low digital skills are an issue that needs to be addressed in a digital economy strategy, as it is cross-sectoral, specific and explicit focus will be required for the aging rural farming population that consists largely of women, but also the elderly and the illiterate.
- **Low digital literacy hinders the adoption of new technologies especially in an aging rural population.** If farmers have limited access to digital solutions or are unable to use them, because they lack digital skills, further uptake is likely to be significantly impeded. Innovators should be encouraged to take deliberate actions to ensure innovations are inclusive of those with lower digital literacy and lower literacy levels to enable both a raised awareness of the benefits of digital agricultural innovations but also to enable their use.
- **The development of strong campus networks and the strengthening of NRENs are key to fostering higher education institutions and innovation hubs to effectively provide all types of digital services for teaching, digital agricultural training, digital agricultural entrepreneurship, and advanced research activities.** In the field of digital agriculture, mutual learning will be significantly enhanced by providing complementary expertise where it is lacking and sharing IoT/precision agriculture equipment for students and entrepreneurs.
- **Partnerships such as Regeneration Mauritius have a particularly important part to play leveraging agritech and food systems innovations and bringing finance partners into the relationship whilst driving climate sensitive solutions and employment**. It is important to boost the digital agriculture entrepreneurship sector through the acquisition of advanced skills in the space and an alternative model of sustainability for the incubators (especially those who are not supported by the government). Involving the private sector through regional or local agriculture/digital agriculture companies might offer internships for students and helping aspiring entrepreneurs to acquire new skills. Alongside it will help a more entrepreneurship-oriented approach adapted to the current labor market where youth can innovate in a context where agriculture is still regarded as old fashioned (which may discourage youth to get into digital agriculture initiatives). Collaborations with private sector entities may also facilitate new forms of fundraising/investments such as open innovation experiences and the funding of specific trainings/incubations programs for youth.

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