

DIGITAL AGRICULTURE COUNTRY STUDY ANNEX: NAMIBIA

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

The baseline data collected provides insights into the extent to which Namibia 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 Namibia, 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 Namibia 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 Namibia, Ms. Mirjam Taapopi, who is also a Trainer at the Ministry of Agriculture, Water and Land Reform and in the Research and Training Division (TVET). Unfortunately, it was not possible to schedule time with the second CCARDESA focal point Mr. Vihoroka Kaapehi, who is Chief Agricultural Scientific Officer in the Ministry of Agriculture, Water and Forestry. The study team also worked with a National Consultant in Namibia, Ms. Flora Tibazarwa.

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).

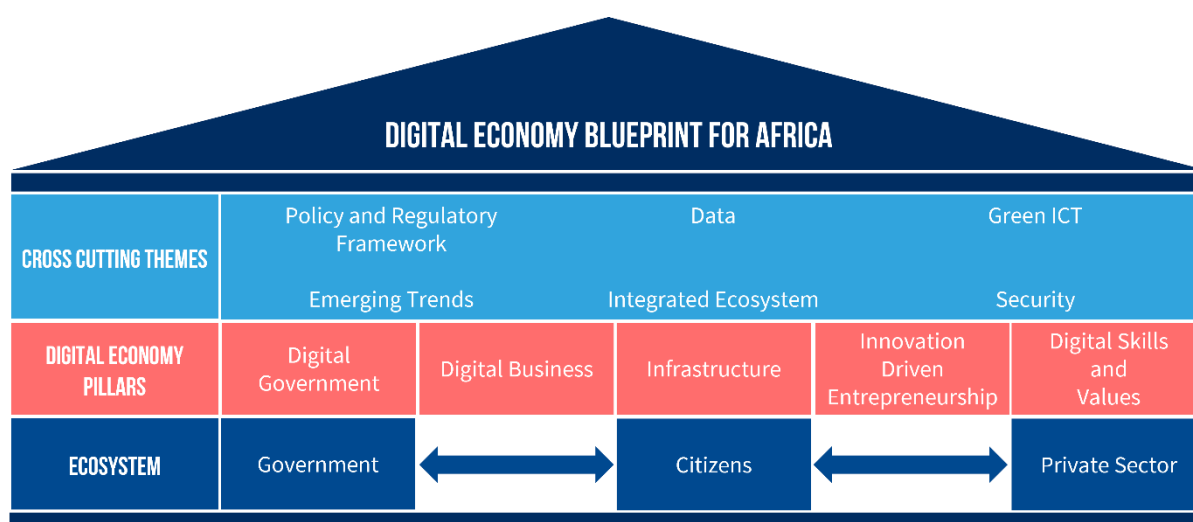


FIGURE 1 OVERVIEW OF KENYAN DIGITAL ECONOMY BLUEPRINT

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

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

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

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

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

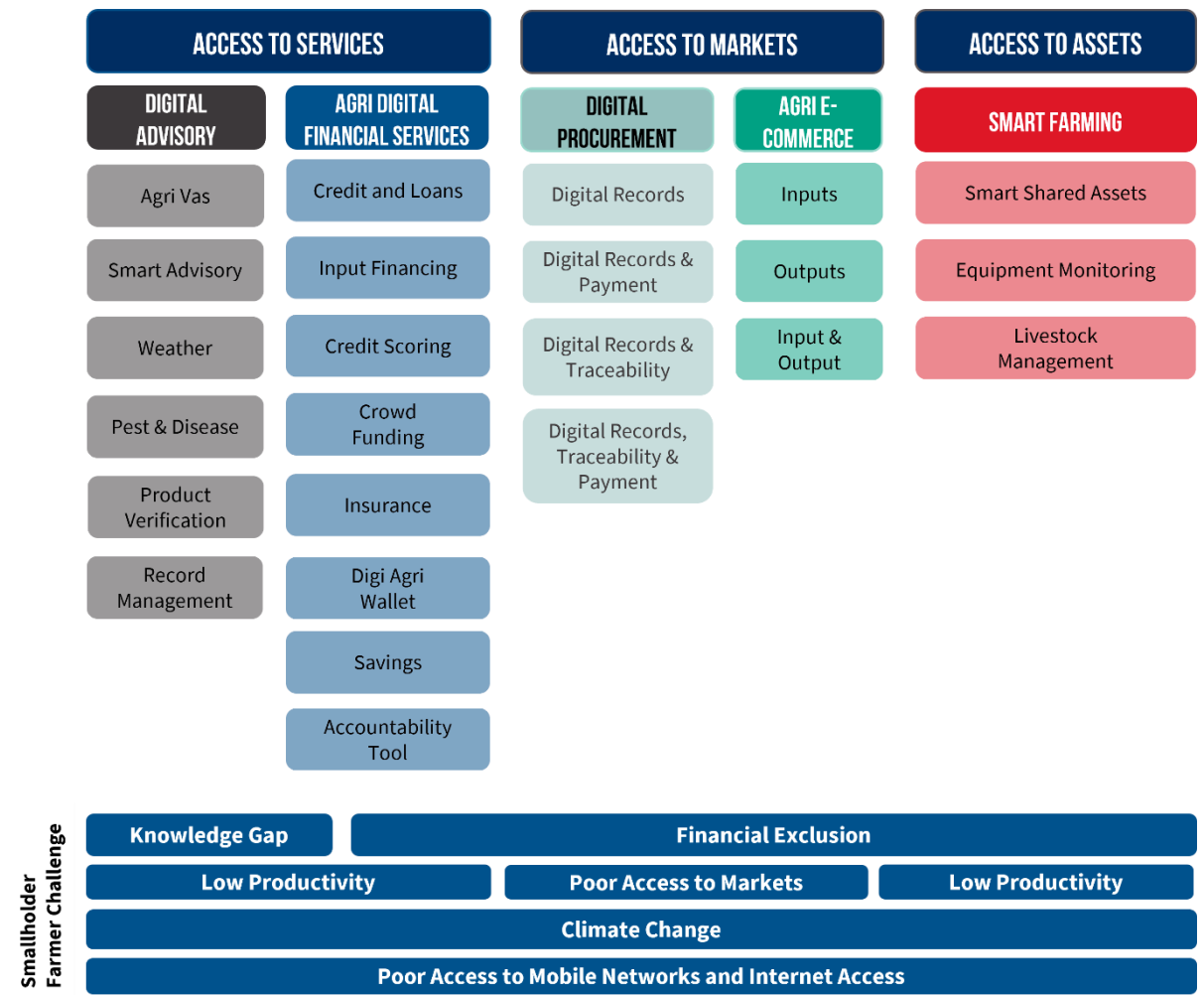


FIGURE 2 USE CASE MODEL BASED ON GSMA FRAMEWORK

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



DIGITAL SYLLABI

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

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

DIGITAL SYLLABI

Across the region, the response rate of universities to the survey tool and interviews was 47% which was a reasonable response rate. However, the response rate is variable between countries and the number of participating universities in some countries was much lower than expected given their diversity and maturity and contrasted highly with 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 KIs 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

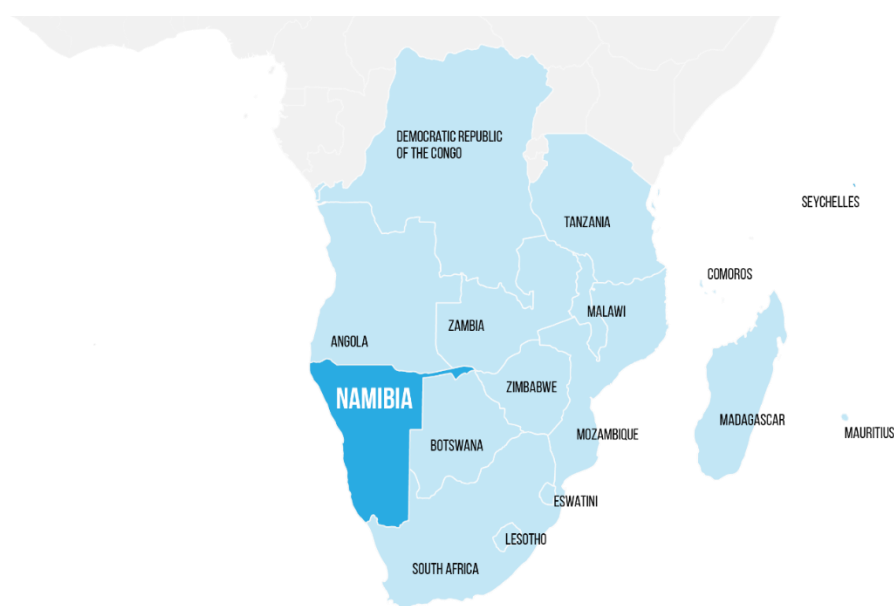


FIGURE 3 MAP OF NAMIBIA IN SADC

Namibia is an upper-middle income country with a population of 2.5 million.¹ The UNDP's Human Development Indicators rank Namibia as 130th out of 190 countries and fifth out of the 16 SADC countries.² The country scores on the higher scale in the region for gender equality with a Gender Development Index of 1.007.ⁱ It has a Gross National Income per capita of \$9,220 (compared to an average of \$8,277 in the region).³ Although 38% of the population falls under the UN Multidimensional Poverty Index,⁴ only 17.4% 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 Namibia's population is also only slightly lower than the average in SADC at 21.8 years (versus 22.1 years).

AGRICULTURE ENVIRONMENT

In the case of urbanization, Namibia is above average in the SADC region with 51% living in urban areas. Although only 9.04% of the GDP is earned in agriculture, 21.85% of the population works in the agriculture sector (lower than the average of the SADC region of 43.37%).

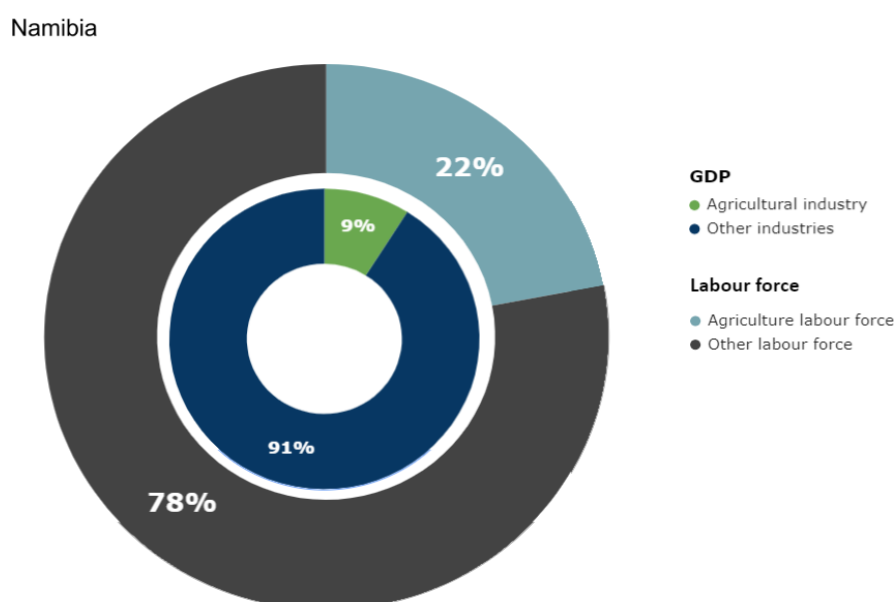


FIGURE 4 NAMIBIA'S AGRICULTURAL INDUSTRY SHARE OF GDP AND THE SHARE OF THE AGRICULTURAL LABOR FORCE

1.4 THE GENERAL DIGITAL ECOSYSTEM

In 2020, the African Union (AU) adopted the [Digital Transformation Strategy for Africa \(2020-2030\)](#) which presents a vision of an integrated and inclusive digital society and economy in Africa. It recognizes the digital economy as a key factor in stimulating economic growth and jobs, reducing inequality, and promoting sustainable growth⁶. 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.

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

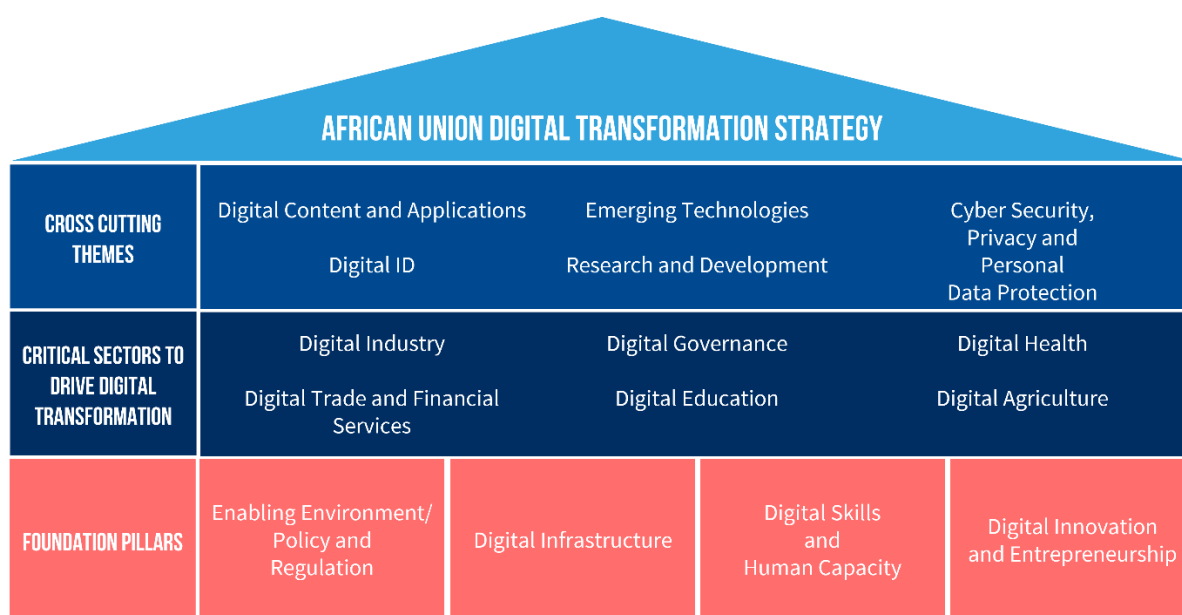


FIGURE 5 OVERVIEW OF THE AFRICAN UNION DIGITAL TRANSFORMATION STRATEGY

The transition to, and importance of, a digital economy is illustrated in the prevalence of this agenda within regional institutions, donors, and multilateral organizations. Where agendas previously focused on ICTs, providing hardware and universal access, the focus is now on enabling a digital economy with a more holistic view of digital and ICTs. The digital economy considers sectors beyond the IT industry and encourages a whole-of-government approach to have more emphasis on the overall ecosystem and economy⁷.

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 Namibia are illustrated in table 3.

TABLE 3 BENCHMARK PILLAR SCORES: NAMIBIA

Namibia	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: NAMIBIA

In the benchmark assessment Namibia ranked eighth out of the 16 SADC member states. Figure 6 below illustrates the results of the benchmark in comparison to the Global and African medians. Namibia matches or exceeds the African median in all but the G5 Digital Economy benchmark. It scored the best in the digital government pillar. The benchmark suggests that Namibia has some key foundational elements necessary for a robust digital economy.

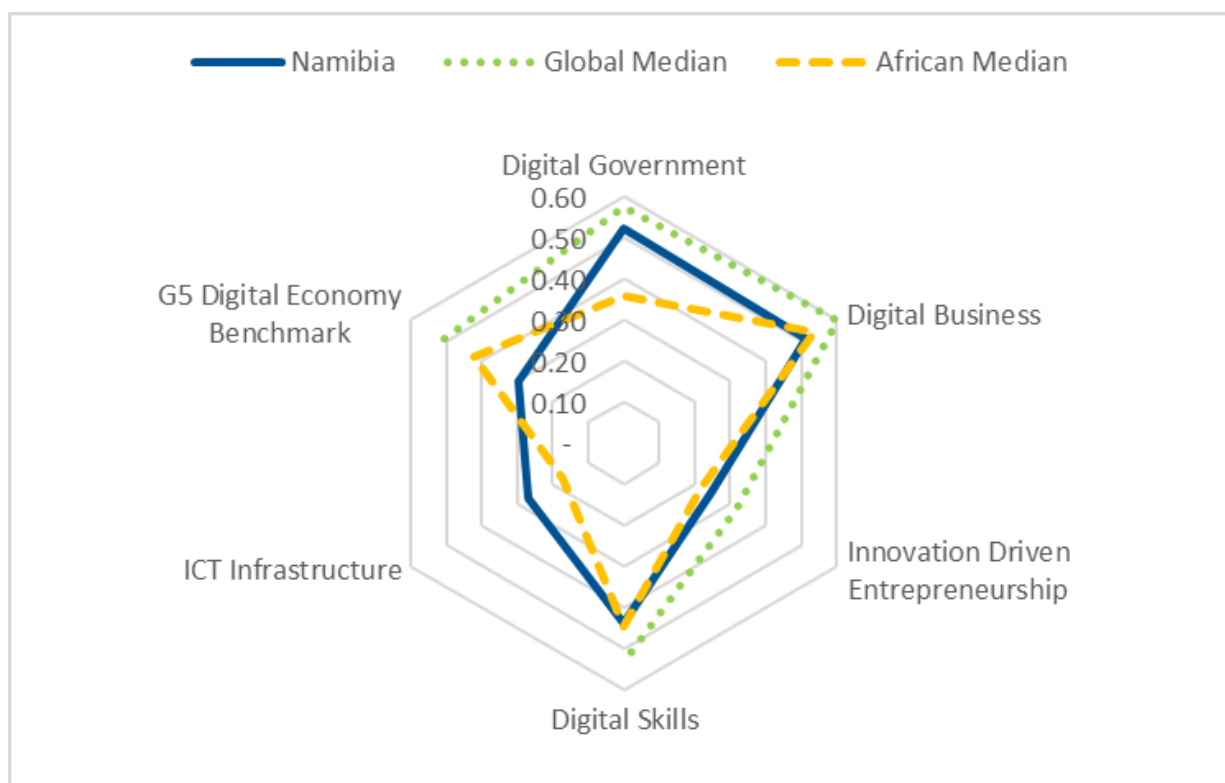


FIGURE 6 RESULTS FROM BENCHMARK ASSESSMENT FOR NAMIBIA

Namibia scored highest in the innovation driven entrepreneurship pillar, ranking fourth. It ranks well for the other assessment areas except for the ITU G5 digital economy benchmark. Table 5 below, illustrates the ranking for each individual pillar where it predominantly ranked in the top half of countries for all pillars.

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

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

DIGITAL INFRASTRUCTURE

Namibia ranks fifth out of 16 SADC member states in the ICT infrastructure pillar, and this is reflected in the high usage of internet by the population (51%).⁸ This is much higher than the regional average of 29.94%. The GSMA Mobile Connectivity Index shows a 75% access to the 3G network,⁹ which complements the HDI report of mobile cellular subscriptions at 112.7 per 100 people.¹⁰ Namibia also ranks as 100th on the Inclusive Internet Index which details the accessibility, affordability, and relevancy of internet in 120 countries.¹¹ However, according to the Mobile Connectivity Index,¹² Namibia is ranked number six in terms of overall mobile connectivity in the SADC countries with an overall index of 40.2, which qualifies it as an emerging country (above 35). It scores above average for consumer readiness, affordability, and availability of infrastructure, but below average on content and services.ⁱⁱ In terms of ICT adoption, Namibia scores position 105 (out of 140). The Namibian government seems to be future orientated based on the position 40 (out of 140), though it scores lower on the innovation capability index as number 104 out of 140.¹³ However, it scores higher with 3.63 out of 7 points on the GCI 4.0 Digital Skills Among the Population Index, which surpasses the SADC average.¹⁴

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

2 THE BROADER POLICY ENVIRONMENT

In the benchmark assessment Namibia ranked eighth out of 16 in the region, scoring well in all but the G5 benchmark pillar. The average scores and ranking in the assessment pillars indicate that Namibia is unlocking the digital economy to an extent, but it is unclear from these results whether there is a robust enabling environment. In the *Situational Analysis Report* the clusters of SADC countries identified from the benchmark are discussed in more detail but Namibia forms part of Group 3 which is made up of countries that are in digital transition and could benefit from learning from its regional neighbors.

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 frameworks¹⁵. 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 advance much faster than regulations and policies¹⁶. The inherent risks of rushing policies and regulations into effect must be weighed against the benefits, as getting the pacing wrong could ultimately lead to greater barriers to innovation and risks creating regulations that could be outdated¹⁷.

2.1 GENERAL DIGITAL POLICIES

The benchmark assessment suggested that Namibia's digital economy is developing. The stock take supports this assessment as there is clear prioritization of digitalization within available documents.

POLICIES, STRATEGIES AND PLANS

The **Overarching ICT Policy 2009** and the **Information Technology Policy 2008** build on the previous ICT Policy (2004) for Namibia and set out a cohesive agenda and policy direction for national development and to facilitate the growth of the ICT sector. Specific focus is placed on education and training, supporting an enabling environment through improved legal and regulatory frameworks, and increased access and affordability to services and infrastructure. Increased competitiveness to stimulate the market will be achieved through liberalization, sensible deregulation, lower barriers for entry, and establishing an independent regulatory authority. These initiatives are all intended to lead to reduced costs and improved services. The Policies set out a clear responsibility for the Government: to provide sound policy framework, regulate markets, and support additional service provision, while the private sector should be responsible for providing ICT services and products to market. The vision of the Policies is clear and identify three crucial areas to help unlock the digital economy: infrastructure, regulatory environment, and digital skills.

There are several additional strategies and policies available, specifically with regards to e-Government and public services:

- **E-Government Policy for the Public Service 2005** which encourages the use of ICT in public administration, organizational change, new skills to improve public and democratic processes and strengthen support to public policies.
- **Universal Service and Access Policy 2013** which seeks to promote an enabling environment with the regulatory authorities and promote internet and broadband access to the nation.
- **E-Government Strategic Action Plan 2014-2018** which details a five-year plan to transform delivery of information and public services through e-Government.
- **Ministry of ICT Strategic Plan 2017-2022** which builds on the ICT policy with a focus on four aims: accelerating ICT development, access and use for an inclusive ICT Smart Namibia; enhancing unhindered access to information; promoting Namibia as a film destination; and enhancing an enabling environment for high performance and effective service delivery.
- **National Broadband Strategy 2019-2029** which has the overall aim of achieving universal access and encourage the development of content and applications in e-Government and other sectors to improve service delivery. It also supports efforts to build capacity and skills for digitalization and provides an enabling environment for broadband deployment and consumer protection.
- **Public Sector Innovation Policy 2020** which is championed through the Office of the Prime Minister and aims to build the capacity of public officials and institutions, promote public sector innovation and creativity, develop a model for incubating innovations in the public sector, and promote research and knowledge management for public sector innovations.

Themes of universal access of information, affordable communication and technology infrastructure and services are restated through all these documents. These guiding principles are reinforced through the national plans of **Vision 2030**, the **National Development Plan 5** and the **Harambee Prosperity Plan II (HPP2)** which stipulate that ICT must be the most important sector in the economic development of the country by 2030. The HPP2 which is the most recent document and prepared during the Covid-19 pandemic, promotes the need for greater digital inclusion, as well as more specific goals such as enacting the Cyber Crime Bill and the Data Protection Bill by 2021, and developing a Cyber Security Strategy and Awareness Creation Plan by 2021. It also embraces the possibility of the Fourth Industrial Revolution and disruptive and advanced technologies and services, calling for an assessment of Namibia's labor force.

The emphasis on digital skills and infrastructure is apparent in the benchmark assessment where Namibia scored highly, surpassing the regional median for infrastructure. These strategies and policies provide a clear vision and overall aim for embracing digitalization generally within national plans and strategies. There currently is no available implemented Digital Economy policy or strategy but the Ministry of ICT is working on a draft National Digital Strategyⁱⁱⁱ. What is encouraging from the list of strategies above, is the understanding and prioritization of infrastructure, digital skills and a robust regulatory environment which are foundational for digital transformation and this message has remained throughout.

ⁱⁱⁱ KII with public sector stakeholder

2.2 LEGISLATION

According to the Namibia Legal Information Institute (NAMIBLII) which publishes the laws of Namibia online there are only two relevant pieces of legislation within this sector:

- **Communications Act 2009** which provides regulation of telecommunications services and networks, broadcasting, postal services and the use and allocation of radio spectrum; establishes an independent Communications Regulatory Authority of Namibia and provides provisions for its powers and functions. This Act was amended in 2019 which imposed regulations and provisions on a regulatory levy and a universal service levy.
- **Electronic Transactions Act 2019** provides a framework for the promotion of the use of electronic transactions in Namibia; legal recognition of electronic transactions and signatures; provides for consumer protection in electronic commerce; and regulates the liability of service providers for actions of their clients.

Despite the articulation of the regulatory and legal framework as a priority for its national strategies, the legal framework is surprisingly smaller than expected in Namibia. These provisions may be enough for now for the necessary development but as noted in HPP2, it is likely that more disruptive and emerging technologies will infiltrate the market and will require additional regulations and legislation. There is also a large gap around any kind of regulation or legislation around cybersecurity, privacy, data protection or access. There is a Data Protection Policy and a Data Protection Bill being drafted but a timeframe for this is unclear^{iv}.

The stock take of available strategies and legislation suggests that digitalization is being embraced in national strategies and it seems that there are several strategies and policies under development.

2.3 DIGITALIZATION IN AGRICULTURE

DIGITAL IN AGRICULTURE POLICIES

The **Namibia Agriculture Policy (NAP) 2015** is the overarching policy for the sector and is prepared in line with Vision 2030 and the Fourth National Development Plan which set agriculture as an economic priority sector. The NAP includes a specific section on *Agriculture Management Information Systems*, this focuses mainly on providing data on agriculture, water, and forestry for planning and decision-making purposes for both public and private sector usage, to improve current information systems, promote skills development in agricultural statistics and ICTs, and to integrate different databases. However, there are no detailed plans on how these intend to be implemented. There is little mention or reference made in the rest of the NAP to incorporate new digital technologies beyond information production and management.

The **Agriculture Marketing and Trade Policy and Strategy 2011^v** acknowledges the benefits of accurate, sufficient, and real-time information that allows for correct commercial decisions and how this can best be achieved through ICT systems. Beyond advocating for systems to be devised with the needs of the agriculture sector in mind and setting up ICT centers to help with the dissemination of marketing information, not much

^{iv} KII with public sector stakeholder

^v The version available was titled second draft July 2011

else is included within this strategy that details the potential and opportunities available within the agricultural system for digitalization.

Beyond these small additions in the above policies, it is not clear whether digitalization has been embraced within agricultural systems and policies of Namibia. However, there is a lot of scope for opportunities for greater digitalization. Namibia scored poorly under the G5 benchmark pillar, lagging the SADC and African median, which looks at the shift from ICT to a digital economy and to what extent there is a spillover of digital technology in other sectors, if there is collaboration across agencies, and whether there is a “Digital Economy Policy Agenda”¹⁸. Currently there is not an overwhelming amount of evidence to support the notion that digitalization is being embraced or prioritized within the agriculture sector.

CHALLENGES

The agriculture sector only contributes 2.8% to GDP but supports over 70% of the population and employs a third of the work force¹⁹. The NDP5 aims to increase agricultural production, develop agro-processing industries, enhance animal health and production, enhance preparedness for effective response and recovery to natural disasters, and increase the productivity of smallholder or communal farmers. Greater digitalization could support these initiatives, such as increasing productivity of smallholders but there needs to be a clear strategy involved in identifying suitable solutions that manage the risks involved.

One barrier to adopting and implementing innovations is the lack of skills and knowledge of modern technology in rural farmers who tend to be older^{vi}. Intensifying agricultural extensions services to smallholders is one strategy suggested in the NDP5 and is a popular way to integrate digital into agricultural systems and introduce innovations to understand the benefit of digitalization. Alongside extensions services, the organization of cooperatives to increase access to credit and acquire agricultural equipment is a strategy suggested in the NDP5. Preparing a strategy or policy for this that embeds the use of ICTs and integrates digital solutions and technologies could increase uptake and provide training of skills to rural farmers.

Digital technologies within agriculture are included in research, farmers unions and rangeland management^{vii}. With a Digital Strategy under development, and stakeholder consultations with Ministries across Government, there is opportunity to better identify and integrate appropriate solutions to increase agricultural productivity. Focus on e-Government and digital integration within public services, which should be an effective way to increase uptake within the population, must continue but this must coincide with training and education at all levels. The prioritization has often been at the school level²⁰. Other enabling factors outside of the Ministry of Agriculture’s control will also need to be considered for full unlocking of digital transformation in agriculture, such as adequate infrastructure and access to networks and connectivity that is affordable.

Despite Namibia scoring well on the benchmark assessment for a digital economy, it seems that there are gaps around the strategies and plans both national and sectoral to embrace digitalization with the agricultural system. A clear National Digital Strategy with adequate focus on the agriculture sector, but also focus on the spillover from other sectors and themes will be paramount to the success of increasing productivity of smallholder farmers in Namibia to reduce reliance on imports. Digitalization has not been embraced adequately within the agricultural systems of Namibia, from a public sector perspective.

^{vi} KII with public sector stakeholder

^{vii} KII with public sector stakeholder

3 DIGITAL AGRICULTURAL INNOVATIONS

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

3.1 MAPPING DIGITAL AGRICULTURAL INNOVATIONS

The DACS for Namibia presents use cases according to a typology and framework developed by GSMA (See figure 2). The broad areas include access to services, access to markets and access to asset classes.

A total of 16 innovations were identified in Namibia that had a mix of use cases as illustrated in Figure 7 below. Seven innovations were for a single use case and nine were part of a bundled service with multiple use cases (three innovations provided 5 use cases, two innovations provided 4 use cases, three innovations provided 3 use cases and one innovation provided 2 use cases). Of the innovations identified, eight were operational only in Namibia and eight were operational in multiple countries, including Namibia.

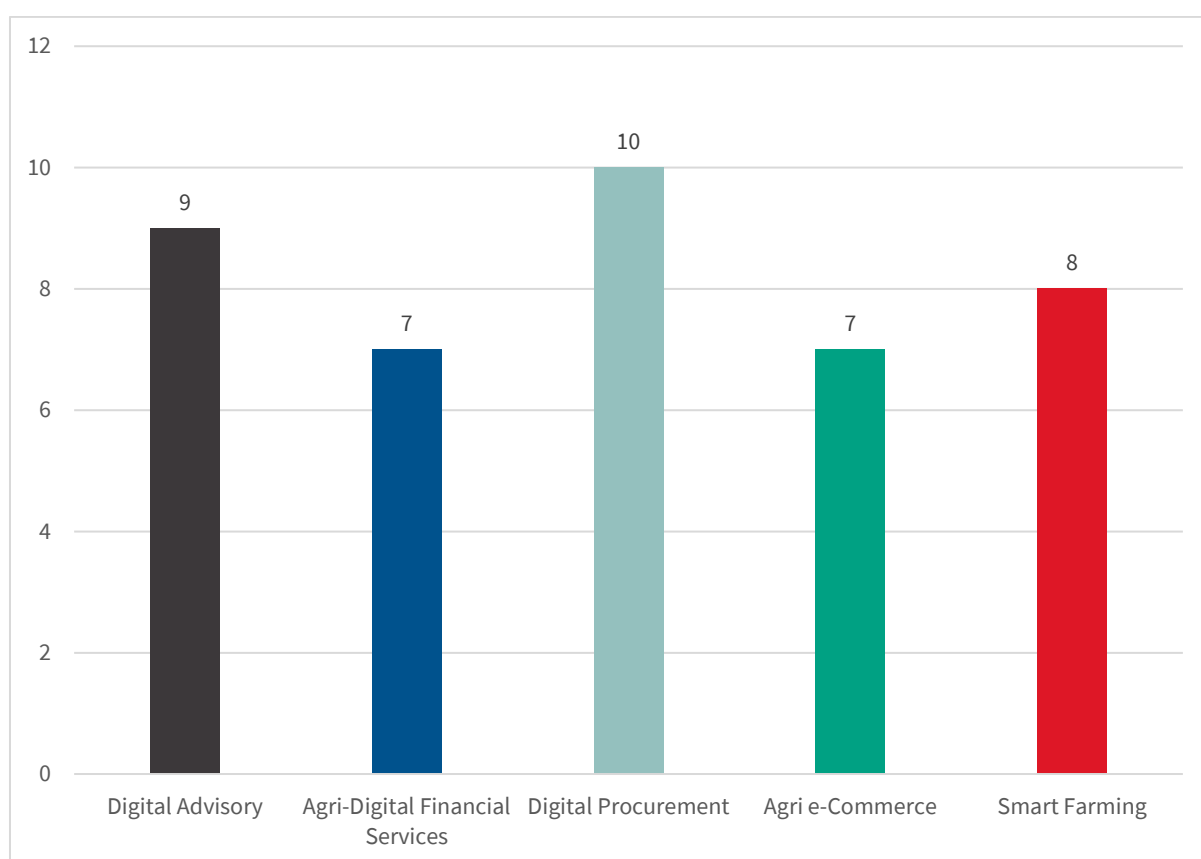


FIGURE 7 IDENTIFIED USE CASES FROM INNOVATIONS IN NAMIBIA

The table below presents an overview of all identified innovations with their use cases, if they filled in the survey or not, 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 NAMIBIA

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 ALL IDENTIFIED DIGITAL AGRICULTURAL INNOVATIONS OPERATIONAL IN NAMIBIA

				Name of innovation	Name of the company	Survey ✓/X	Description of innovation	Operational Countries in SADC
	■			AfriMoola	BoxFusion and Nedbank Uhkeshe Enterprise	X	BoxFusion and Nedbank Uhkeshe Enterprise have now partnered to create Afrimoola, a digital mobile money wallet to assist farmers with payment and e-wallet/ Voucher solutions. Afrimoola is a Fintech under the Nedbank Ukheshe Enterprise program. It is a dynamic Fintech and digital ecosystem built on the ethos of financial inclusion. Afrimoola technology is managed by digital transformation technology company, Boxfusion that provides cutting edge software solutions, providing solutions to may South African government departments, companies, and enterprise clients. Boxfusion has a 12-year track record and are 100% public sector focused and are a gold partner of Microsoft. Afrimoola platform offers omnichannel solutions, wallets, eCommerce, digital money movement across networks, banks and boarders, savings and stokvel solutions at the touch of a button for merchants and customers.	Namibia, South Africa, Zimbabwe
	■		■	Agricultural Produce Brokers	None	X	There is growing awareness of the fundamental and vital role fruit and vegetable consumption plays in human health and nutrition in both developing and developed countries. The initiative aims to integrate the fast-growing vendors to market, technology, value addition and supply of affordable quality produce to the Namibian community at a fingertip. Furthermore, the initiative aims to serve as a platform for educating and promoting health consciousness in consumption and will promote sustainable food production, including access to Agri-digital Financial Services through collaborative efforts.	Namibia

■		■	■	■	Agrimate	Box Fusion	X	Agrimate uses NDVI, sentinel 2 Infrared Satellite Images, Computer Vision and Artificial Intelligence to calculate Expected Yields and Credit Losses in Agriculture. This is also integrated into a Value Chain management system that manages the day to-day farming operations giving a 360 view of value chain in real time.	Namibia, South Africa, Zimbabwe
	■				AgriTask GIS	AgriTask	✓	Agritask GIS by Hollard is a digital innovation and digital insurance solution for Index/Parametric Insurance connected to Meteosat satellite GIS platform and can remotely activate a smartphone to collect GPS data or points of agricultural plots and finally estimate the plot size. Using this innovation Hollard remotely get information about the size of agricultural plot and use this information to assess farmer eligibility for agricultural credit or insurance access and can enroll farmers. It addresses farmers being able to plan effectively and ensure that they can produce efficiently and gain access to markets. The company Hollard operate in Botswana, Lesotho, Mozambique, Namibia, and South Africa and launched Agritask in 2020. They have 10 active users so far and 34,000 registered users. The service enables access to insurance products and in doing so access to financial services. The digital innovation relies on GPS, Smartphones and GEO data. It uses spreadsheets (Excel, to cloud-based SQL, third party SaaS software providers and IBM Watson AI platforms. The innovation is transitioning to scale and was developed using donor grants from government or foundations. Currently still dependent on program support Swiss Capacity Building Facility. Their recent feasibility study on livestock insurance in Namibia, Botswana and Mozambique looks at index-based insurance and agricultural loans and their bundling as part of a potential public sector program focused on areas prone to drought. Their technology is inclusive of disadvantaged groups.	Botswana, Lesotho, Mozambique , Namibia, South Africa
■	■	■	■	■	AgroMate/ AgriFusion	Chartered Systems Integration	X	AgroMate from AgroMate (Agri Fusion) have created a unique platform that links farmers with off takers and financial institutions which provides the risk management of farmers to guarantee delivery of the product to the off takers. This is the first platform of its kind that addresses financing of farmers, aggregating orders from off takers and allocating them to farmers to plant the crop and applying Agri VAS with Artificial Intelligence for the ongoing monitoring and evaluation of the farming activities. This allows the financier to use this data to calculate expected credit losses for each offtake agreement in real-time. Banks are now able to offer purchase order factoring to finance farmers with a high degree of predictability of the risk and outcomes. This data can also be used for crop insurance to reduce the risk of non-	Eswatini, Mozambique , Namibia, South Africa, Zambia, Zimbabwe

								performance of the crop. This innovation has not been validated on the ground and did not fill out the survey.	
■	■	■	■	■	AgroTech Mobile Application (AMA)	AgroTech Smart Farming	✓	<p>Launched in 2020 the Agrotech Mobile Application (AMA) is a mobile application designed with the aim to help Namibian citizens with crop farming, marketing and sales of farming products. As well as meet the government halfway in terms of food security and provide statistics concerning agronomic performance. It is to provide or currently provides digital advisory, agri-digital financial services, digital procurement, agri e-commerce and smart farming. Currently, the android version of the app is completed – and with the funding from Groupe MRP, an Indian-based company, they plan to create the IOS version and expand to other countries. The app has also won an award from the MTC telecommunications Company under a UNDP Challenge Session on Agriculture and the IoT. Digital Agri advisory covering agricultural and livestock information, weather and climate information and information on market prices. Agri VAS are delivered via voice channels (IVR, helplines), text channels (SMS and USSD) and via apps., website, Portal, messaging platforms. OSmart advisory: Data-driven advisory based on tailored, farm-level agro-climatic and crops- specific information to support decision making, maximize productivity and reduce costs. Filling predominant knowledge gaps. Technologies such as sensors, satellites, and drones, as well as big data analytics and AI, underpin many of these services., Weather information:</p> <p>Specialist services that provide regional and localized weather forecasts. This sub-category may include weather-adaptive and climate-smart advice, Pest and disease management: Digital tools that help farmers diagnose plant disease and develop strategies to treat diseased plants as well as mitigate future outbreaks. Most of the services are accessible via mobile applications and require a farmer to upload a picture of the infected plant for diagnosis. Some services are also accessible via USSD. Also includes national and regional-level pest and disease early warning systems., Record keeping: Digital tools that enable farmers to keep detailed records of livestock, including health and feeding data, to help mitigate diseases and avoid missed conceptions. Record keeping tools are also used to keep details of input usage, procurement, cost and revenue and sales records. Equipment monitoring: The smart monitoring of equipment such as irrigation systems that enable farmers to remotely control, track and look after their equipment and farming operations, leading to a reduction in water consumption and wastage., Smart shared assets: Digital tools that enable the sharing</p>	Namibia

								economy for assets such as tractors, drones, and other mechanized farming equipment. They provide smallholder farmers an opportunity to mechanize processes such as crop spraying, crop monitoring and land preparation. The outcomes include improved access to markets, increased efficiency and post-harvest loss, agronomy services within accessible range for farmers. It requires basic and feature phones, computers, cloud-based databases, and cloud-based SaaS.	
								Challenged by data collection issues, operational constraints, and translation into local languages. Dealing mostly with planning, inputs and on-farm production, post-harvest processing and access to markets. Still at the R&D stage of development. Charge individual business subscription fees, advertise, monetize data, transaction fees, Corporate CSR, and government funding. Technology has taken explicit actions to ensure it is inclusive.	
■		■		■	AvaGro	Shalom Farm	X	AvaGro is an agricultural solutions provider for smart or precision agriculture and grow flowers and vegetables on a commercial basis using tailor-made solutions under different climatic conditions. They offer solutions based on partnering with farmers and appropriate technology such as greenhouse infrastructure and provide training.	Namibia
■	■	■	■	■	Crowd Funding Platform for Poultry Farmers	iFarming	X	iFarming (formerly trading under the name of Namasiku Bainga). Their website is under development and are an emerging agribusiness focused on digital advisory, agri digital financing through crowdfunding, digital procurement, agri e-commerce and smart farming. iFarming has a two-pronged strategy, which includes processing and marketing facilities at key areas across the country, here we will consolidate, process, grade, package, and market chicken products from small to medium scale farmers.	Namibia
								Via their crowd farming platform, anyone from anywhere in the world can invest in these farmers who will turn have working capital to continue farming and to expand operations. They have included have sensors monitoring the vital conditions and environmental conditions to reduce mortality and increase production. They bring farmers, investors, and markets together on one platform, and go into contract with small farmers, who will supply broilers and eggs and they will market the eggs and meat.	

					E-License application for Exporters of Agri-products and Agricultural ERP	Twenty Third Century System	✓	E-License application for Exporters of Agri-products and Agricultural ERP (2020) from Twenty Third Century System. Farmers apply for export licenses online using a clean and friendly user interface. Operational in Malawi, Mozambique, Namibia, Tanzania, Zambia, and Zimbabwe with 135 registered users.	Malawi, Mozambique, Namibia, Tanzania, Zambia, Zimbabwe
					FARM4TRAD E Namibia	The Namibia Agronomic Board	X	FARM4TRADE Namibia of the Namibian Agronomic Board has a website and promotes the agronomic industry enabling facilitation of production, processing, storage, and marketing of staple products in Namibia. They provide regulatory services and permits, agronomy with market pricing information, horticultural and research and development services. They have regulatory services to ensure a sustainable crop industry in Namibia. They undertake Board Control and Farms and Facilities Inspections. This is necessary for local marketing mechanisms for agronomic and horticultural crops to ensure that produce imported into or exported out of Namibia is safe and of good quality. They also provide agronomy services on white maize, pearl millet and maize as staples and despite farmers having a secured market through grain trading and marketing mechanisms, Namibia imports these crops. NAB issues permits and marketing mechanisms and information to enable farmers to produce these crops and import any that are necessary. Similarly, Namibia imports fresh fruit and vegetables, but traders must buy 47% of produce produced locally. NAB provided services geared at facilitation production and marketing and implements the market share scheme. They undertake continued research and produce market intelligence reports and enterprise budget guides. The facilitate opportunities for commodity trade and e-commerce although these offerings are not digital at present.	Namibia
					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	Botswana, Eswatini, Lesotho, Mauritius, Namibia, Seychelles, South Africa,

							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 countries 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.	Tanzania, Zambia, Zimbabwe	
■		■		■	GeoFarmer	GEOTERRAIMAG E (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 GeoTerralimage 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. GeoTerralimage 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 GeoTerralimage use remote sensed data to create spatial information. They combine advanced information and reporting to enable analysis, quantification, and monitoring to support key decision making. They charge business subscription fees for their fully commercial product and believe their technology is inclusive of underrepresented groups.	Angola, Botswana, Comoros, Democratic Republic of Congo, Eswatini, Lesotho, Madagascar, Malawi, Mauritius, Mozambique, Namibia, Seychelles, South Africa, Tanzania, Zambia, Zimbabwe
		■			Pay Today	Pupkewitz Holdings (Pty) Ltd	X	PAY TODAY is a leading mobile payment solution in Namibia which enables payment receipts, payments, airtime, payment of utility bills and parking. It is the product of Nedbank and works with any Namibian bank. Using an App from Apple or Google play, a debit or credit card can be added to your account from which payments can be made straight from the mobile phone, for shopping transactions, booking events and bank details can be entered to enable friends and family to make direct payments to you, and from the e-Wallet created it can be used to may	Namibia

								bill payments or pay for parking. A PCI DSS Level I compliant card and tokenization system stores card details. The Merchant Account is at Nedbank Namibia and the Paygate Ltd is the payment service provider. Works on all devices running iOS version 8 upwards and Android (4 and upwards) operating systems. They have a website and portal, and Facebook page, and have a dashboard login and sales on-line or payment gateway for businesses. 1400 businesses are linked to PayToday.	
				■	Portable hydroponic beds	Innovative Green Hands	✓	Innovative Green Hands at the University of Namibia in conjunction with AvaGro and Jayden Nashe Enterprises of South Africa (Portable Hydroponic Beds). This is a very new private sector company in Namibia which was launched in 2021 and deals with Smart AgriTech dealing with Equipment monitoring. The innovation enables crop production under the harshest conditions through a controlled environment, artificial planting media system, precise water and nutrient applications and including crops such as Spinach, Tomatoes, Peppers, Eggplants, watermelons, and Cucumbers. The smart monitoring of equipment such as irrigation systems that enable farmers to remotely control, track and look after their equipment and farming operations, leading to a reduction in water consumption and wastage. The approach enables reduced water footprints in horticulture (esp. button and oyster mushroom) in otherwise arid production systems. The company has been working to address user affordability and a lack of technical capacity. They have received support on training and practical agriculture from Avagro and best practice models to develop their idea into an investible business. To date, the young agripreneurs have designed a prototype portable hydroponic unit capable of producing fresh vegetables for family's that live in towns where space and land are limited. They are now marketing this as part of their product basket.	Namibia
■			■	■	ProFood App	ProFood	X	ProFood App is a multistakeholder e-commerce platform which is led by a women's-only team and supported by UNDP in partnership with the Namibia University of Science and Technology (NUST) and Green Enterprise solutions. The ProFoodApp digitizes local and traditional food system flows by enabling us to map, visualize and monitor Small Scale Producers (SSP) to understand who is producing what, where and in which quantities. The APP maintains a	Namibia

							database of all the SSP nationally, enabling State and Non-State actors to procure directly from the SSP. This creates an appetite for increasing production of local and traditional foods and empowers communities and producers at the local level. The APP also responds to at least five of the Sustainable Development Goals (SDGs). This is a private sector company, but their innovation is at a very early stage of development.		
■					Skudu Exact	Skudu.co.za	✓	This is an innovation implemented in Malawi, Mozambique, Namibia, South Africa, and Zimbabwe. Skudu Exact launched in 2019 provides smart advisory: Data-driven advisory based on tailored, farm-level agro-climatic and crop specific information to support decision making, maximize productivity and reduce costs. It addresses planning, inputs, and on-farm production. Technologies such as sensors, satellites, and drones, as well as big data analytics and AI, underpin many of these services. It enables farmers and agronomists to effortlessly automate and expedite plant nutrition guidelines for multiple blocks and fields and product guidelines are issued specific to crop growth state and ordering and application for soil correction. Skudu's algorithm generates the requirement for lime, gypsum, fertilizer, and foliar feed specific to the crop, growth stage and region based on provided soil and leaf sample analyses. They have 400 registered users and 50 active users. Their challenges include bridging time and technical capacity to generate plant nutrition guidance (content). They have also had constraints on farmer uptake and technical usability of the platform. They are transitioning to scale, have been funded by technology investors and charge business subscription and transaction fees.	Malawi, Mozambique, Namibia, South Africa, Zimbabwe

3.3 RESULTS FROM INNOVATION SURVEY RESPONDENTS

All identified innovators received a survey and seven innovations in Namibia responded. The survey results are self-reported. Of the innovations identified, two were operational in Namibia only and the remaining five operated in several countries. All identified innovators were reminded several times by email and by phone to complete the survey. The response rate of the survey for Namibia was 44% (7 out of 16 identified innovations responded).

USE CASES AND SUB USE CASES

The division of GSMA use cases shows that in Namibia single use cases are most common. Five out of eight respondents provided single use services and only two respondents provided multiple use cases. One respondent provides all five use cases in their innovation, and one provides three use cases.

Figure 8 below provides the division of use cases. Digital procurement was the most common use case cited by four survey respondents, followed jointly by digital advisory and smart farming. Agri digital financial services and e-commerce were only cited once, respectively. E-commerce was the only use case that was not present in the Namibian-only innovations. Figure 8 also illustrates a comparison of use cases to the rest of the identified innovations in the SADC region.

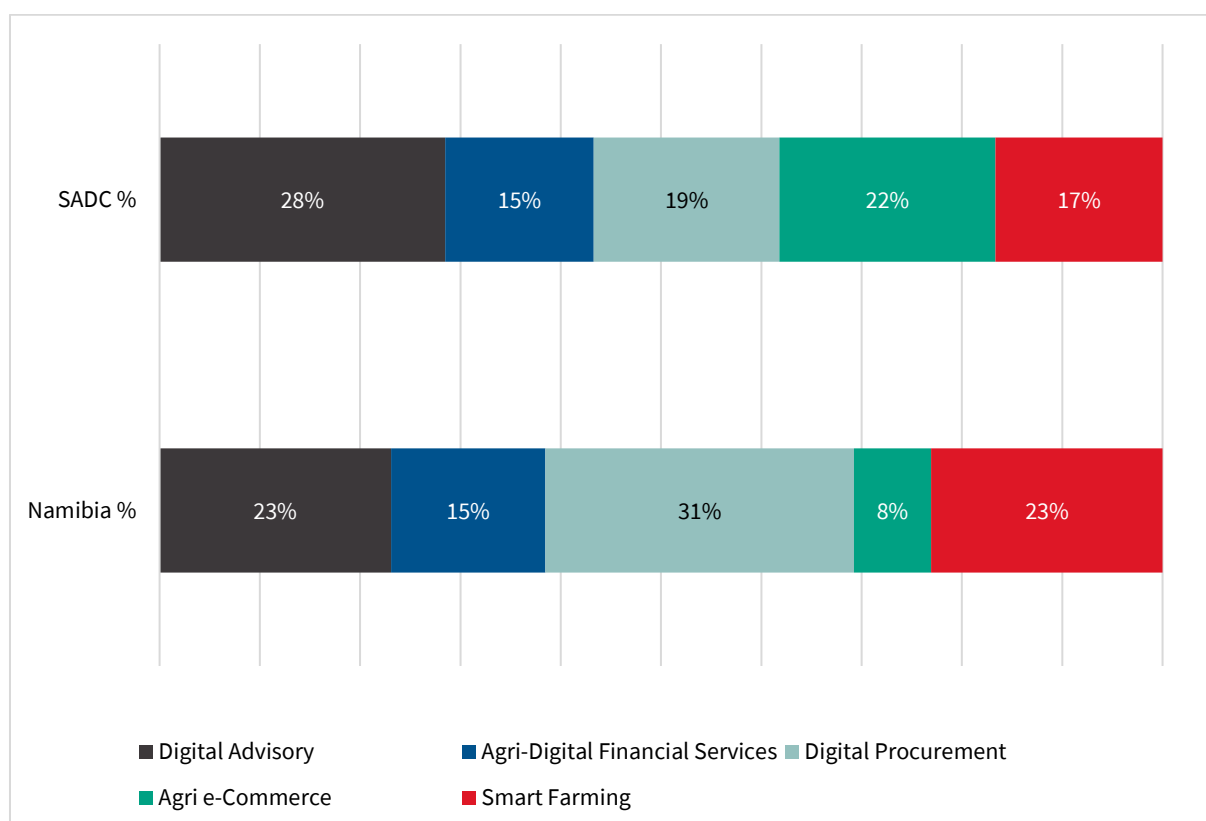


FIGURE 8 DIVISION OF USE CASES FOR SURVEY RESPONDENTS IN NAMIBIA VS. IDENTIFIED INNOVATIONS IN SADC

The innovations in Namibia cover almost all sub use cases as presented in figure 9. There are also a few smart farming use cases on managing equipment, such as irrigation equipment, to geodata mapping using GIS and sensor IoT technologies.

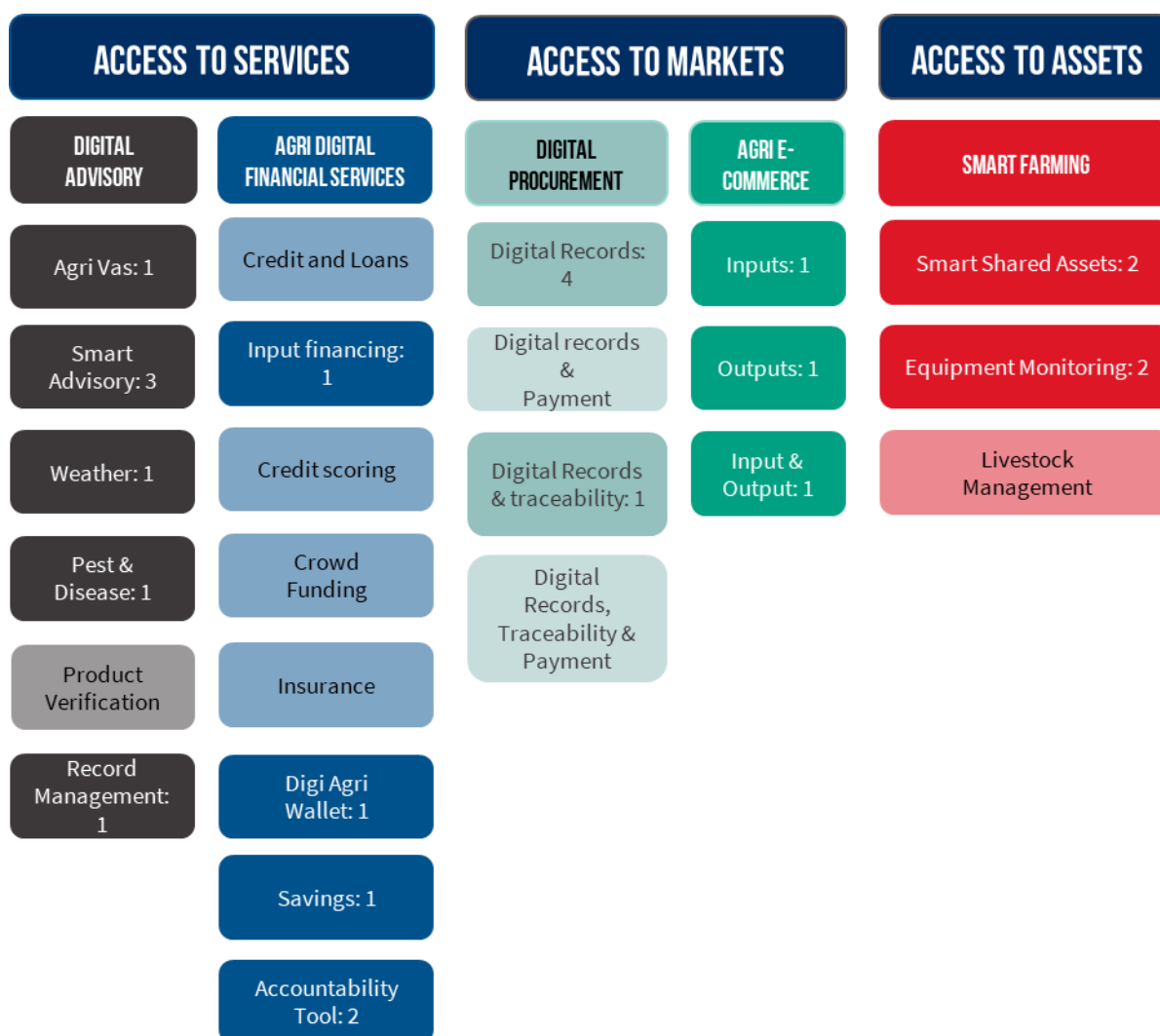


FIGURE 9 OVERVIEW OF SUB USE CASES PRESENT IN SURVEYED INNOVATIONS IN NAMIBIA

CHALLENGES

The innovations targeted a wide range of anticipated outcomes. Addressing poor access to markets (4) and financial exclusion (3) were the most common. The knowledge gap, low productivity and climate change were also common.

By far the biggest challenge in the application of technology is farmer uptake and behavior change and this is probably quite closely related to digital literacy levels. Notably, the local innovations (operating in Namibia only) only faced the following challenges: user affordability, lack of technical capacity, data collection issues, operational constraints, and problems with product development or translation in a local language for better understanding by the end users.

TECHNOLOGY USE AND CHANNELS

Most innovations require computers (4) or smartphones (2) to utilize the innovation. Basic feature phones, satellites, and GPS were also cited. These devices are reflected in the channels used for the innovation, with websites (5) and smartphone apps (3) the most common. Mobile voice, SMS, geo data and social messaging platforms (such as WhatsApp) were also noted. Tools used for analysis are predominantly cloud-based databases or software, followed by spreadsheets and local databases, such as MS Access.

VALUE CHAIN PHASES COVERED

Most innovations in Namibia are addressing digital procurement solutions around planning, input acquisition, on-farm production to post harvest components. They address poor access to markets by farmers, followed by filling the knowledge gap and addressing financial exclusion. There are clear gaps around storage and transport solutions.

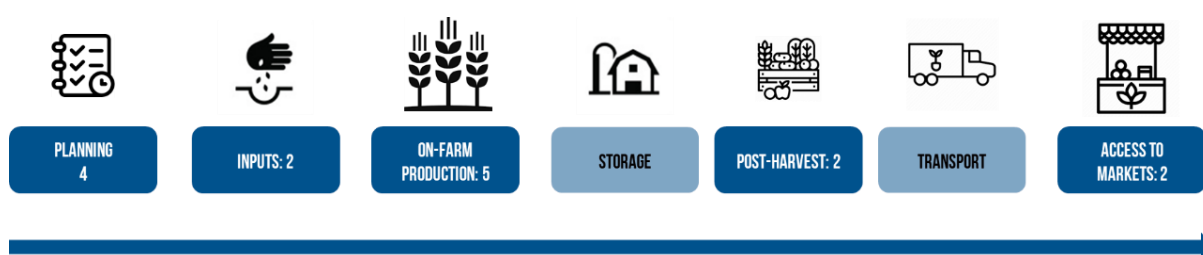


FIGURE 10 SURVEYED INNOVATIONS PRESENCE IN THE VALUE CHAIN IN NAMIBIA

DEVELOPMENT AND SCALING

Most innovations were launched in 2020 (3). The rest all launched in 2021, 2019, 2017 and 2002. All but one innovation is developed by private sector companies (6), and one has been developed by an NGO. Despite the innovations being private sector-led, National government bodies or agencies, commercial agriculture companies and research institutes were the most common actor involved in developing the innovation. There was a slight shift when discussing the actors involved in implementing the innovation, as entrepreneurs were the more common in implementation, followed by commercial agriculture companies and international donors or philanthropic programs.

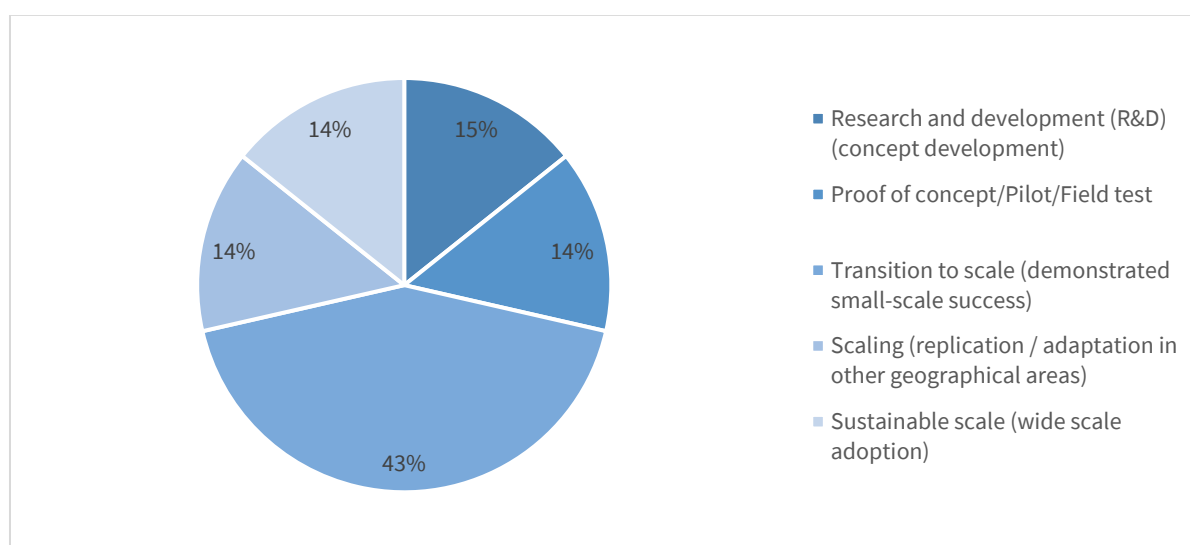


FIGURE 11 SCALING STAGES FROM SURVEYED INNOVATIONS IN NAMIBIA

In terms of scaling, most digital innovations in Namibia are transitioning to scale based on the [Insights on Scaling Innovation](#) report²¹. They have demonstrated small scale success. Three innovations were transitioning to scale (all regional operations). Two local innovations were in the concept development phase and proof of concept phase, respectively.

TARGET AUDIENCES, FUNDING, AND SOURCES OF REVENUE

Most innovations are targeted at businesses, but the most common primary users are farmers, government agencies or cooperatives. Extension workers tend to be the intermediary users, followed by other value chain actors.

Common financial mechanisms to support the innovation include impact investors, business development support, and training opportunities with most of these respondents from regional innovations. Incubators and self-funding were also mentioned by the local innovations. Most innovations charge business subscription fees, charge transactions fees or provide a paid for premium service. Some have also received host county government or donor funding support. There is a mixed picture on financial sustainability with two innovations noting that donor support or subsidies would be required, two respondents noting they would not require further support (both regional innovations) and three were unsure whether additional subsidies would be required.

INCLUSIVITY

The surveys are self-reported so there is no way to corroborate the results, but most innovations noted that their technology was likely already inclusive of certain groups, particularly the elderly, women, and smallholder farmers. A small proportion had attempted to use explicit ways to ensure inclusivity for those with limited literacy and smallholder farmers, women, disabled and the elderly.

4 DIGITAL AGRICULTURAL SKILLS AND ENTREPRENEURSHIP TRAINING

The 2008 Information Technology Policy²² for the Republic of Namibia recognized entrepreneurship and Small and Medium Enterprises (SMEs) as important contributors to economic growth and job creation. The Namibia Government's Vision 2030²³ document stipulates that ICT must be the most important sector in the economic development of the country by 2030.

Namibia has a national research and education network (NREN) called Xnet, which was established as a connectivity provider for schools in 2004 and later expanded to include all educational institutions in 2007. Xnet partners with telecommunications operators in Namibia to obtain subsidized pricing on behalf of its beneficiaries. Xnet's beneficiaries include tertiary education institutions, libraries, teacher's resource centers, vocational training centers, as well as schools.

The 2020 Network Readiness Index²⁴ rated Namibia 93rd out of 134 economies in the technology pillar. The technology pillar considers access to technological infrastructure, content and usage, and the vision for future technologies. These ratings provide an indication that Namibia requires support to prepare for a digital agricultural future.

4.1 AGRICULTURAL SYLLABI UNIVERSITIES

A total of two Agriculture Universities were approached in the country:

- Namibia University of Science and Technology
- University of Namibia

The [Namibia University of Science and Technology](#) was the only respondent to the survey.

NAMIBIA UNIVERSITY OF SCIENCE AND TECHNOLOGY

The Faculty of Computing and Informatics (Computer Science Department) of the Namibia University of Science and Technology offers various onsite and online digital training courses since 1990. Regarding the levels of implementation of these digital training courses, nine are delivered at certificate level, 13 at B.Sc. and three at M.Sc. level. Three digital agriculture courses are delivered at M.Sc. level. All the courses are aligned with ICDL, IEEE, ACM, and AIS. NUST offers its learners essential digital skills training through the Computer Literacy course during their Undergraduate programs (and more advanced skills to specific programs).

Regarding digital agriculture, the faculty trains students in Big Data for analytics in agriculture, Artificial Intelligence for agriculture, Internet of Things for agriculture, and programming and coding for agricultural systems, which are all taught online at M.Sc. level.

Entrepreneurship trainings, such as Digital Content Creation and other Agriculture related skills focus on starting a business, finding a job as an employee, and working in the public sector or in advanced research (PhD, research institutions, etc.). For the faculty, Agri-e-commerce is the most important skill to facilitate youth absorption into Namibia's agricultural labor market. The ICT Laboratories are considered the most

important facility for digital training by the Faculty of Computing and Informatics/ Computer Science Department.

TABLE 7 OVERVIEW OF RESPONSES FROM SURVEYED UNIVERSITIES IN NAMIBIA

NAMIBIAN UNIVERSITIES	
Namibia University of Science and Technology - Faculty of Computing and Informatics/ Computer Science Department	
Digital Agri Skills	Big Data for analytics in agriculture Artificial Intelligence for agriculture Internet of Things for agriculture Programming and coding for agricultural systems
Digital training courses updated	Yes
Digital entrepreneurship trainings	Digital Content Creation Agriculture related skills
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, others, etc.)
Most important digital Agri skills	Agri e-commerce
Most important facility for digital trainings	ICT Laboratories
Aligned with institutional strategy	Yes, ICDL, IEEE, ACM and AIS.

4.2 INCUBATORS AND INNOVATION HUBS

A total of seven business support organizations were mapped in the country, out of which six are operating in the agricultural sector. The general business support organizations without focus or activity in the agricultural sector that have been identified are [Namibian SDG HUB](#) and [the Hub](#). For these organizations we did not find evidence of training and incubation activities dedicated to agriculture entrepreneurs and therefore they were not targeted for the KIIs.

The agriculture-related business support organizations that were identified and contacted include:

- [Namibia Business Innovation Institute \(NBII\)](#)
- [Fablab Namibia](#)
- [StartUp Namibia](#)
- [Agra ProVision](#)
- [Bokomoso Entrepreneurial Center](#)

These organizations support entrepreneurs and youth in Namibia to build their digital and entrepreneurial capacities and skills in the agricultural sector. **Only one** business support organization responded to our request to take part in a KII.

BOKOMOSO ENTREPRENEURIAL CENTER

Bokomoso Entrepreneurial Center is an incubator established in 2013 but known as a Trust since 2010. The trustees are representatives from affiliated organizations such as the Namibia University of Science and Technology-Centre for Entrepreneurial Development, the Development Bank of Namibia, the NedBank and an independent entrepreneur. The center provides a minimum 3-year incubation program in addition to the provision of infrastructure and space for startups, a wide variety of entrepreneurial trainings, along with information and education sessions related to businesses. Agricultural related trainings are only provided with support and cooperation from stakeholders such as National Commission on Research, Science and

Technology (NCRST). Five agricultural startups have been supported by the center to date: one in Mahangu milling, one in yogurt and butter processing, one in skin care product manufacturing and two in the processing of marula oil. The incubator does not teach digital agricultural training and provides only general ICT courses as digital training. The Bokomoso Entrepreneurial Centre collaborates with the Namibia University of Science and Technology.

TABLE 8 OVERVIEW OF RESPONSES FROM INTERVIEWED INCUBATORS IN NAMIBIA

NAMIBIAN INCUBATORS	
Bokomoso Entrepreneurial Centre	
Year of Establishment	2003
Agri start-ups incubated	5
Target of Digital Agri trainings	None
Digital Skills trainings	None
Digital Agri Tools taught	None
Collaboration with Universities and Colleges	Namibia University of Science and Technology (NUST)
Supported by the Government?	No

5 INSIGHTS AND REFLECTIONS

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

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

5.1 INSIGHTS

BENCHMARK RESULTS

Namibia ranked eighth out of 16 in the benchmark assessment which suggests that it has some key foundational elements necessary for a robust digital economy. 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. Namibia ranked in the middle of the SADC member states for most pillars except the G5 digital economy benchmark (which identifies the presence of policies and regulations that are dynamic and flexible and promote the digital economy) where it ranked thirteenth.

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. Namibia makes up part of Group 3, these countries ranked in the middle of the benchmark and tend to be more reliant on agriculture for employment and economic growth.

POLICY ENVIRONMENT

The stock take of national policies and strategies identified that digitalization is being prioritized in Namibia. Eight key documents were developed that focus on ICT dissemination, supporting an enabling environment for the ICT sector, e-Government, universal access, digital skills, and cyber security. Three national plans have also stressed the importance for greater connectivity, digital inclusion, and a greater focus on legal frameworks that enable the use of emerging technologies in Namibia. There is also a National Digital Strategy in development which reiterates the prioritization by Government of this agenda for development and growth. Namibia has repeatedly realized the importance of the foundation that infrastructure, digital skills, and a robust regulatory environment provide for a digital economy. However, the legal and regulatory environment is still somewhat underdeveloped with gaps in cybersecurity, privacy, and data protection. These frameworks need to be strengthened and harmonized with international standards to attract greater investment in the sector.

Despite the positive progress in national policies and plans generally, there is limited evidence to suggest that this focus on digital transformation has transferred to agricultural policies. Policies need to be implemented within the sector that build on the national strategies to support an environment that would be conducive to

greater digital innovations, such as improved connectivity and farmer uptake of technologies so that strategies complement each other and support the overall digital ecosystem and all stakeholders.

DIGITAL AGRICULTURE INNOVATIONS

The research into the Namibian ecosystem was able to identify 16 innovations that were either digital agricultural innovations or digital innovations serving a predominantly rural and farming population. The use cases from Namibia illustrate that the most common were related to digital procurement solutions, followed by digital advisory and agri e-commerce, and then smart farming and digital financial services. Most innovations in Namibia are addressing digital procurement solutions around planning, input acquisition, on-farm production to post harvest components and access to markets. They address poor access to markets by farmers, followed by filling the knowledge gap and addressing financial exclusion. There is some attention to low productivity and resilience to climate change. However, the study suggested gaps in storage solutions and transport in the value chain. With the emphasis on livestock in the agricultural system, it may be that these solutions are integrated into current production systems and managed by more commercial operators. Interestingly, there are likely to be real opportunities to diversify and elaborate on the content of digital innovations relevant for the Namibian farmer.

Many of the challenges cited by respondents referred to farmer uptake and behavior change, and these may be related more to digital and language literacy levels and age. Although affordability was also mentioned, the cost of data is lower and the connectivity higher than other countries in the region. A lack of technical capacity for teams, data collection and product development constraints, point to a lack of digital skills in Namibia to drive advances in these areas. With relatively low access to computers at the household level and internet access, and without any clear information on the ownership of phones, be they analogue or smart, it is surprising that most of the channels used include computers predominantly followed by smartphones and basic feature phones.

DIGITAL AGRICULTURAL SYLLABI AND ENTREPRENEURSHIP TRAINING

In terms of assessing digital skill development, the study suggests that digital agriculture courses seem to be well integrated into the curriculum of agricultural higher education in Namibia, however, capacity building for digital entrepreneurship education is needed. The University respondent is well equipped in IT skills and digital trainings but those are not tailored to the agricultural entrepreneurship space. The incubator interviewed has a strong need for digital and more specifically digital agriculture skills to be integrated into their entrepreneurship trainings. A closer cooperation and exchange of competences between Universities and Incubators is suggested to improve the development of digital agriculture curricula for the incubator and integrate the entrepreneurship skills within the University courses.

For the incubator interviewed, CCARDESA and other international partners could better support the development of digital skills for agricultural youth entrepreneurship in the SADC region by: identifying the relevant agricultural entrepreneurial initiatives that are functioning and understand how to better support them to empower the digital agriculture ecosystem; supporting capacity building activities through the encouragement of peer-to-peer learning and benchmarking visits of successful AgriTech solutions; and promoting the establishment of NREs to address affordable internet connectivity and value-added services to support digital agricultural development.

5.2 REFLECTIONS FROM THE SITUATIONAL ANALYSIS REPORT

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

- **Government has a role in improving access to the digital communication channels for the population and farmers.** Collaboration across government departments, the private sector, and the incubation ecosystem towards the telecom operators (public and/or private) to improve the internet connection and make it available for the innovators (the entrepreneurs) and the users (the farmers and local population) is also required to facilitate the access to these services and promote entrepreneurship.
- **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 to enable a raised awareness of the benefits of digital innovations and to enable farmer use.
- **An agriculture sector specific digital strategy and roadmap is necessary with clear objectives, milestones, timelines, and funding requirements to tie in the sector performance with a digital economy advancement.** A lack of a guiding policy or strategy was a barrier for stakeholders to implement innovations or digital solutions that would be sustainable. The FAO states that “committing piecemeal resources to ICT4Ag on an *ad hoc* basis, results in higher costs and lower impacts”²⁵. A clear agriculture sector specific strategy or roadmap can address some of the key challenges raised by stakeholders consulted during this study.
- **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 or digital agriculture companies might offer internships for students and helping aspiring entrepreneurs to acquire new skills. Collaborations with private sector entities may also facilitate new forms of fundraising or investments such as open innovation experiences and the funding of specific trainings or incubation programs for youth.

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

Centre for Coordination of Agricultural Research
and Development for Southern Africa

World Bank Group