



DEVELOPMENT OF INFORMATION, COMMUNICATION & TECHNOLOGY BASED KNOWLEDGE PRODUCTS IN 3 SELECTED COUNTRIES

CONTENT ANALYSIS AND AUDIT REPORT OF THE CCARDESA KNOWLEDGE HUB AND TFCA PORTAL

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List of Abbreviations

ACCRA	-	Adaptation to Climate Change in Rural Areas in Southern Africa
AFAAS	-	African Forum for Agricultural Advisory Services
AR&D	-	Agricultural Research and Development
ASARECA	-	Association for Strengthening Agricultural Research in Eastern and Central Africa
CAADP-XP4	-	Comprehensive Africa Agriculture Development Programme ex-Pillar 4 Programme
ACCRA	-	Adaptation to Climate Change in Rural Areas in Southern Africa
CCARDESA	-	The Centre for Coordination of Agricultural Research and Development for Southern Africa
C-NRM	-	Climate Resilience and Natural Resource Management
CORAF	-	West and Central African Council for Agricultural Research and Development
DeSIRA	-	Development Smart Innovation through Research in Agriculture Initiative
EU	-	European Union
FARA	-	Forum for Agricultural Research in Africa
NARES	-	National Agricultural Research Systems and extension systems
SADC	-	Southern African Development Community
RECs	-	Regional Economic Communities
KM	-	Knowledge Management
KPs	-	Knowledge Products
TFCA	-	Trans-frontier Conservation Areas

1. Introduction

The Centre for Coordination of Agricultural Research and Development for Southern Africa (CCARDESA) is a sub-regional organization that was established by SADC Member States (MS) to coordinate agricultural research and development (AR&D) among its 16 Member States. With its headquarters situated in Gaborone, Botswana, CARDESSA's vision is to assist member states to attain food security and build a prosperous Southern African region with vibrant rural livelihoods. Its mission is to promote innovative research, technology generation and adoption for sustainable agricultural development through affective partnerships and capacity building.

CCARDESA therefore has a broad mandate to assist its Member States in coordinating their agricultural research and development and also to empower smallholder farmers to improve their product efficiency and generate increased incomes through active market engagement while navigating the current polycrises (Covid-19, worsening climatic conditions, worsening economic growth and the Ukraine war). All of these have negatively affected the global food security.

To mitigate against these negative effects, CCARDESA is supporting smallholder farmers to adopt sustainable agricultural practices, particularly in response to the challenges posed by worsening climatic conditions. However, the main issue is that although CCARDESA has active outputs on areas of KM and information dissemination of their products, there is a serious limitation in audio-visuals as most of their products are in paper format which has been proven not to be as effective. Furthermore, the Internet of Things' (IoT) main tenet is on digitalization and this is a better way to respond while bridging Africa's youth demographic dividend.

In addressing these issues, CCARDESA focuses on the following:

1.1 COMPREHENSIVE AFRICA AGRICULTURE DEVELOPMENT PROGRAMME EX-PILLAR 4 (CAADP-XP4) PROGRAMME.

The Agricultural Research for Development (AR4D) institutions comprising African Forum for Agricultural Advisory Services (AFAAS), Association for Strengthening Agricultural Research in Eastern and Central Africa (ASARECA), Centre for Coordination of Agricultural Research and Development for Southern Africa (CCARDESA), West and Central African Council for

Agricultural Research and Development (CORAF) and Forum for Agricultural Research in Africa (FARA) are currently implementing the Comprehensive Africa Agriculture Development Programme ex-Pillar 4 (CAADP-XP4). This Agricultural Research and Innovation Programme fall under the European Union's (EU) Development Smart Innovation through Research in Agriculture (DeSIRA) initiative. The CAADP-XP4 Programme supports a science-led and climate-relevant agricultural transformation in Africa. It aims at strengthening the capacities of the above-mentioned organizations to deliver on their AR4D mandate and to collectively support their respective member states and country fora to implement relevant programmes.

1.2 CLIMATE RESILIENCE IN NATURAL RESOURCE MANAGEMENT (C-NRM) PROGRAMME

The SADC/GIZ Climate Resilience and Natural Resource Management (C-NRM) Programme whose main objective is mainstreaming of climate change in agriculture and strengthening cross-border management of natural resources in the SADC region is a new initiative to build on the foundation laid by the Adaptation to Climate Change in Rural Areas in Southern Africa (ACCRA) programme in continuing with building the capacities of SADC member states to integrate climate change aspects into agricultural programmes and investments. The C-NRM project has the following outputs:

1. The strategic planning framework for mainstreaming climate change into cross-border NRM is strengthened
2. The dissemination of knowledge on CSA and CSNRM is strengthened
3. CSA and CSNRM measures are implemented in selected TFCA's
4. Priority COVID-19 sensitive measures of the SADC TFCA Tourism Programme are implemented in a climate-sensitive way.

CCARDESA is helping to implement output 2 of the C-NRM programme i.e., dissemination of knowledge.

In line with CCARDESA's 5th thematic area Knowledge and Information Management, Communication and Policy, CCARDESA sought a consultancy to develop information and Communication Technology (ICT) based knowledge products in 3 Member States.

2. PROBLEM STATEMENT

Since inception CCARDESA has created and continues to create strategic partnerships and strengthen existing ones in order to deliver on its mandate. All partnership agreements are aligned to the objectives and functions of CCARDESA as prescribed in the charter. CCARDESA has strong partnerships with the private sector, public sector, Inter-governmental organizations, farmer organizations, United Nations Agencies, national and international research organizations, Regional Economic Communities (RECs), commodity networks, NGOs and media.

Some of the direct beneficiaries of CCARDESA implementation include; the private sector, Directorates of Research, Directorates of Extension, National agricultural knowledge and innovation systems (NAKIS), Policymakers, Academia, Research institution and universities. The ultimate and indirect beneficiaries are the rural poor comprising smallholder farmers, women and youth agripreneurs and pastoralists, as well as marginalized communities.

As part of its strategic objectives, CCARDESA has developed a significant online presence to support the implementation of the 5th thematic area, Knowledge and Information Management, Communication, and Policy Support. The organization recognizes the importance of providing agricultural research and development stakeholders at national and regional levels with relevant information and knowledge to make informed decisions and drive agricultural transformation. To achieve this, CCARDESA has implemented various online initiatives, which include:

- I. **Website:** CCARDESA maintains an official website that serves as a central hub for accessing information about the organization, its activities, projects, publications, and resources. The website provides a user-friendly interface to navigate through different sections and find relevant information easily. The website hosts a knowledge hub that houses over 850 knowledge products.

The website also serves as an online collaboration platform where stakeholders can engage in discussions, share experiences, exchange knowledge, and collaborate on agricultural

research and development initiatives. This fosters networking and partnerships among stakeholders across the region.

- II. **Social Media Presence:** CCARDESA maintains active profiles on various social media platforms such as Twitter, Facebook, and YouTube. These platforms are used to share updates, highlight success stories, disseminate information, and engage with a wider audience. By building a significant online presence, CCARDESA aims to enhance access to information, foster knowledge exchange, and facilitate effective communication among agricultural research and development stakeholders. This supports their decision-making processes and contributes to agricultural transformation and development in the Southern African region.

However, it is worth pointing out that the knowledge products on the CCARDESA website are mostly paper-based formats leaving a serious gap for audio-visual inclined audiences. Furthermore, most knowledge products are inclined towards climate-smart agriculture. This has resulted in the CCARDESA YouTube channel having lesser users as compared to its other platforms. Increasing audio-visual materials and providing a broad range of topics addressing holistic agricultural research and development information for evidence-based decisions in the SADC region may increase the CCARDESA YouTube users.

CCARDESA's decision to engage a consultancy firm to develop ICT-based (Audio Visual) knowledge products on various agricultural topics demonstrates its commitment to leveraging technology for effective knowledge dissemination and communication. The identified areas of focus, such as transboundary natural resources management, post-harvest losses, organic farming, youth, women, people with disabilities, farmers' success stories, forestry, and other agricultural research and development activities highlight the organization's efforts to address key challenges and promote sustainable agricultural practices.

The purpose of this consultancy project is therefore to:

- I. Develop ICT based or audio-visual knowledge products from selected three member states
- II. Convene Physical regional validation meeting to validate the knowledge products (KP)
- III. Disseminate the ICT based knowledge products to wider audiences
- IV. To train the media in identified gaps and transboundary resource management so that they can comfortably disseminate such information.

3. METHODOLOGY

The methodology for carrying out this assignment in order to obtain the expected output comprised of a detailed situation analysis and content analysis and audit. Below are the details:

3.1 Situation Analysis

The purpose of the Situation Analysis was to gather data (factual and subjective) in order evaluate and identify significant gaps in the information required for the production and dissemination of the KPs. This phase included the following key processes: Desktop Study, literature review, Inception report meeting on 17 May 2023 and a content analysis and audit.

3.2 Desktop Study

To guide the desktop study, the following research topic was derived from the overall objective of the project: **Improving CCARDESA's engagement with audio- visually inclined audiences through ICT-Based (Audio-Visual) knowledge products.**

The desktop study sought to answer the following questions:

1. What types of knowledge products does CCARDESA develop?
2. Who are the audiences of CCARDESA's knowledge products?
3. What are the specific challenges faced by the audiences?
4. Do the knowledge products meet the audiences' agricultural-based information needs?
5. How can CCARDESA broaden its themed content base in agricultural research and development?

6. What type of ICT-Based (Audio-Visual) knowledge products can CCARDESA develop to increase audience engagement?
7. How best can the developed ICT-Based (Audio- Visual) knowledge products be disseminated?

3.3 Literature Review

To answer these research questions, the following internal and external data sources were used. These secondary documents listed in Table 1 below were thoroughly read to get deeper insights.

Table 1: Desktop Study Data Sources

Year	Document
2019	CCARDESA Long-Term Strategic Plan: 2020-2029.
2019	CCARDESA Long-Term Strategic Plan: 2020-2029 – A Synopsis.
2021	CCARDESA Regional Knowledge, Information & Data Capture Guidelines Regional Training Workshop: 22 – 25 November 2021, Workshop Report.

3.4 Content Analysis and Audit

In carrying out this assignment, a thorough content analysis and audit of the CCARDESA knowledge hub and the TFCA portal was conducted. This was for the purpose of establishing the kind of content on both portals and identifying the challenges that have been hindering the dissemination and uptake of the knowledge products on the CCARDESA knowledge hub. Further, it was determined which content on the TFCA portal could be captured on the CCARDESA knowledge hub. Both portals were therefore extensively analysed, individually and also in relation to one another.

The first step of this activity was data collection and preparation. An inventory of all URLs on the website and knowledge hub was created and collected into one excel document. From the inventory of the URLs, a copy of the website or knowledge hub was documented. This content was thus collected from each and every page on the knowledge hub. This made up a corpus of a little more than 2 million words. An inventory of each PDF document on the knowledge hub was also created. This resulted in a recording of 1 188 PDF documents. Each PDF document’s copy and text was then collected into a separate individual document, thus making up 1 188 documents, and totaling more than 6 million words.

It is important to note that this included French and Portuguese words as other documents are written in these SADC official languages. However, only English words were utilized for the content analysis. Having collected the data to use for content and gap analysis, this was further prepared and coded so as to make it ready for analysis. To code the data, key words and phrases were identified and selected that were searched in the data and corpus. These keywords were developed and extracted from the 6 thematic areas as per CCARDESA mandate. The table below presents the key words and phrases that were identified:

Table 2: The phrases and keywords were identified as follows:

THEMATIC AREAS	IDENTIFIED KEY WORDS AND PHRASES
1. Agricultural productivity and food and nutrition security.	2. Agricultural productivity / Improving production and productivity / Increased harvests / Increased yields / Low productivity 3. Food and nutrition security / Food Security / Food production systems 4. Production and productivity of farmers and value chain actors

<p>2. Resilience to emerging agricultural risks: environmental, climate change and transboundary pests and diseases.</p>	<ol style="list-style-type: none"> 1. Resilience to emerging agricultural risks 2. Resilience to environmental change / Adaptation to environmental change / Environmental degradation 3. Climate change / Climate change risks / Climatic shocks / Climate sensitivity / Climate smart agriculture 4. Resilience to transboundary pests and diseases 5. Transboundary pests and diseases 6. SADC TFCAs 7. Natural resources management 8. Wildlife conservation 9. Conflicts between wildlife and human life 10. Forest Products (Non-timber)
<p>3. Commercialization of the agricultural sector and market access.</p>	<ol style="list-style-type: none"> 1. Commercialization of the agricultural sector / Commercialization of smallholder agriculture 2. Market access / Market access for smallholders / Market access for small holder farmers
<p>4. Women, youth and social inclusion.</p>	<ol style="list-style-type: none"> 1. Women empowerment 2. Gender equality 3. Youth employment / Youth participation 4. Social inclusion / Vulnerable groups / Participation of vulnerable groups

5. Knowledge and information management, communication and policy support.	<ol style="list-style-type: none"> 1. Information management 2. Knowledge management (KM) 3. Information and knowledge management 4. Communication / Communication systems / Information dissemination / knowledge dissemination 5. Policy support / Supportive policies
6. Capacity strengthening of CCARDESA and AR4D institutions.	<ol style="list-style-type: none"> 1. Capacity strengthening 2. Capacity building

4.0 Situational Analysis Findings

The following are the findings of the desktop study:

4.1 Types of knowledge products CCARDESA develops

As a broker of regional agricultural knowledge, CCARDESA provides access to a range of curated content that is relevant to its stakeholders. CCARDESA's knowledge hub, which has over 850 knowledge products, contains knowledge products that are mostly paper-based formats of news and research publications. These are for the purpose of sharing agricultural information and research across the SADC region. Furthermore, most of these knowledge products are inclined towards climate-smart agriculture and workshop reports or presentations. These products have gender and youth markers. The target audiences and categories are also listed. The majority of the products however contain very technical or expert language.

4.2 CCARDESA's target audience

CCARDESA's 2020 – 2029 Long-Term Strategic Plan is developed within the Agriculture Research for Development (AR4D) paradigm. The AR4D is derived from the Agricultural Innovation System (AIS), a concept that embraces the total interaction of actors involved in innovation, other than just the science suppliers. It looks at knowledge creation as well as the factors that affect the demand for and use of knowledge in novel and useful ways. It ensures that research and development programmes of an institution are aligned to sectoral, national and regional development goals. Consequently, CCARDESA's strategic plan places the needs of farmers, especially smallholder farmers, and other agricultural value chain actors first.

Smallholder farmers are prioritized because 70% of the estimated population of 330 million people in the SADC region draws its livelihood from agricultural activities as small-scale farmers (CCARDESA, 2019). These farmers live in the rural areas and have limited access to resources and amenities. With such a significant proportion of the population engaged in small scale farming, SADC Member States have prioritized the uplifting of the small-scale farmers in order to increase food production and opportunities for income generation.

Although the food security situation has generally been satisfactory in the past 5- 10 years at macro level, the region has however had continuous annual food shortages at national level which have resulted in a significant number of people experiencing food shortages. The situation in SADC Member States shows high rates of malnutrition. Stunting rates for children under five years of age are over 30% for 10 of the 16-member countries, with four countries registering over 40% stunting rates, translating to a total of 20 million children. It is therefore of high priority in Southern Africa that the number of food insecure people be reduced. Further, it is vitally important to make technologies, innovations and management practices available to farmers so as to empower them and other value chain actors. CCARDESA has a significant role to play in meeting the knowledge needs of these audiences (CCARDESA, 2019).

The agriculture sector in Southern Africa is faced with more challenges that AR4D, through CCARDESA, has to address. These include, among others: low productivity, environmental degradation, climate change risks, limited market access for smallholder farmers, gender

inequality and empowering women and girls, women disempowerment, youth unemployment and lack of supportive policies. Further, as indicated in the 2020-2029 long-term strategic plan, CCARDESA intends to facilitate gender equality, women empowerment and increased employment and participation of youth and vulnerable groups in agricultural value chains, among four other results which respond to the priorities expressed by stakeholders.

CCARDESA therefore needs to urgently meet the knowledge needs of the following target audiences

- Smallholder farmers (in general)
- Women and girls
- Youth
- Vulnerable groups
- Value chain actors such as technical officers, Staff in the public and private sectors, input suppliers, farmers, local traders, processors and exporters
- The general public

4.3 The challenges faced by the target audiences

The specific challenges faced by each of the audiences determine their knowledge needs and thus should inform the knowledge products that are to be developed. This way the knowledge products will be responsive and relevant to the needs of the audiences.

- a. **Smallholder farmers** – Mostly live in the rural areas and have limited access to markets, resources and amenities. They are faced with technical and social-cultural challenges. They need skill improvement as they incorrectly use inputs, produce small quantities with low quality and they lack the commercial or business approach to production. Their focus is more towards subsistence rather than business or specialized enterprises for crop, livestock, poultry and aquaculture products
- b. **Women and girls** – Are mainly marginalised, also mostly live in rural areas and face disempowerment and gender inequality. Women are highly marginalized, faced with

skewed benefit sharing from their labour in favour of men, low participation in decision-making on productive resources, use of income from agriculture, forestry, non-forestry products and fisheries. Women experience the effect of gender inequality at both household and societal levels and carry the burden of unpaid care work. They need skill improvement and social inclusion. They also face barriers to trade as they tend to be marginalized when it comes to access to finance, other services and market linkages to support their agricultural enterprises.

- c. **Youth** – They are vital players in agricultural transformation and food systems through agricultural investments as young agro-entrepreneurs. However, they are mostly unemployed and under-employment. They tend to be urban migrants facing a lack of opportunities, needing skill improvement, job opportunities and social inclusion. Like women, the youth also face barriers to trade as they tend to be marginalized when it comes to access to finance, other services and market linkages to support their agricultural enterprises.
- d. **Vulnerable groups** such as people with disabilities and those living with HIV/AIDS – Mostly unemployed, facing a lack of opportunities, need skill improvement and job opportunities
- e. **Value chain actors** such as technical officers, staff in the public and private sectors, input suppliers, farmers, farmer organizations, local traders, processors, exporters, national agricultural research institutions, extension institutions, national CKM officers, Universities, NGOs, regional and sub-regional agriculture research and extension organizations, international research organizations and other non-state actors. These are faced with technical challenges and also need to improve capacity, effectiveness and positioning.
- f. **The general public** – these are citizens of member countries who lack information, knowledge and skills for venturing into agriculture

4.4 Whether the knowledge products meet the audiences' agricultural-based information needs

There exists a weak linkage between research and extension which continues to impede the transfer of CCARDESA's research outputs to end-users (CCARDESA, 2019). There is therefore a knowledge gap and data accessibility has been the key problem in the SADC region. It is further noted that existing agricultural knowledge and statistics in Africa are mostly spotty and unreliable despite the existence of official statistics agencies in most, if not all, African countries (CCARDESA, 2021).

It is in this regard that CCARDESA needs to generate knowledge products that address the technical challenges faced by farmers and value chain actors for purposes of improving production and productivity. The knowledge products need to be gender sensitive and inclusive of the need to increase the participation of youth in the agricultural value chains as well as catering for the special needs of women and vulnerable groups. The resultant information and knowledge products should therefore be packaged for these different audiences and used to promote increased adoption of research results. The products must focus on long-term mind-set strategies to assist the farmers and other value chain actors to change their approach and start moving on the path of business in agriculture (CCARDESA, 2019). Also critical to this process is the capacitation of Information, Communications and Knowledge Management (ICKM) focal points in SADC Member States (CCARDESA, 2021).

4.5 Broadening CCARDESA's themed content base

AR4D generates technologies that address the technical and policy challenges that farmers and value chain actors are facing. This is aimed at improving production and productivity. Due to climate change, AR4D has the crucial role of generating and disseminating technologies and information that can build ecological and community resilience to climatic shocks and maintains the integrity of food production systems. However, the level of investment in agriculture research in the SADC region is below desired levels. Despite verifiable empirical evidence of high return to investment on agricultural research, the reality on the ground is that out of the 13 SADC countries for which data were available, a total of eight (50%) countries allocated more than 1% of their Agriculture GDP to agricultural research and development, while two (12.5%) spent 1%

and three (18.75%) were below 1% during the period between 200 to 2014. This is in contrast with the commitment by African Heads of State and Government to spend at least 1% of agricultural GDP on AR4D (CCARDESA, 2019).

With reference to value chains in the SADC region, some commodities, such as maize, are given more support by public sector while others, such as sugarcane, wheat, coffee are mainly in the hands of the private sector, with very little direct intervention from governments. Some commodities are traditionally taken for food security systems rather than the commercial markets which affects the level of investments in developing the value chains. CCARDESA's efforts have mainly been directed towards livestock and crops. During the period of the 2020-2029 long-term strategic plan, effort is being shifted to diversify the coverage to include fisheries and non-timber forest products. This is encouraged by the fact that the SADC region has a great potential to sustainably produce a wide range of crops, fish, non-timber forest products and livestock. The SADC countries are taking steps to use the existing potential to spur production, reduce food and nutrition insecurity, improve non-farm income generating opportunities and improve access to amenities. CCARDESA therefore needs to support these efforts by providing knowledge that will spur production in a sustainable manner and address the other issues.

CCARDESA therefore has a unique position as well as un-paralleled comparative advantage in the region to deliver a number of outputs for the much-needed agricultural transformation. In addition, CCARDESA has a functional Information, Communication and Knowledge Management (ICKM) system that is a linkage to the SADC countries. With several years of experience in programme implementation in the region, CCARDESA has learned significant lessons. These lessons reflect the need for CCARDESA to remain vigilant in its efforts to maintain high standards in the provision of agricultural information and knowledge in the SADC region, in line with international good practice. (CCARDESA, 2019).

CCARDESA's theory of change is built on hierarchical progression and relation of actions, outputs and outcomes at different levels. Its interventions or activities are planned and implemented based on thematic areas and this includes the development of knowledge products. The aim is for a set of interventions to generate outputs that will produce outcomes for each of the thematic areas. It is hoped that the combined effects of the outcomes will be the final impacts of CCARDESA's

interventions, which is expressed in its vision of “sustainable agricultural growth and socio-economic development in SADC.”

As indicated in the problem statement, CCARDESA’s knowledge products are inclined towards one theme, which is climate-smart agriculture. However, climate change is not the only key trend. Thematic strategies can be built on key trends such as sustainable utilization of agricultural production resources as well as the application of digital and artificial intelligence for agricultural production, among others. Further, the thematic strategies can be informed by the outputs identified under each of the six thematic areas in the CCARDESA’s 2020-2029 long-term strategic plan. The six priority thematic areas and their associated envisaged outputs are presented in the table below:

Table 3: Thematic Areas and outputs

No.	THEMATIC AREA	OUTPUTS
1.	Agricultural productivity and food and nutrition security	1.New and existing technologies, innovations and management practices developed and promoted by AR4D institutions and productivity increase. 2.Nutrition-sensitive agriculture integrated into AR4D institutions programmes and resilient national and regional food systems improved.
2.	Resilience to emerging agricultural risks: environmental, climate change and transboundary pests and diseases;	1.Enabling regional environment for effective management of pests and diseases as well as natural resources created. 2. Farmers and other value-chain actors supported to sustainably manage the environment and resilient value chains promoted.

		<p>3. The impact of climate change and risk of pest and diseases on farmers and natural resources mitigated.</p> <p>4. AR4D institutions capacitated to support disaster risk reduction initiatives at national level.</p>
3.	Commercialization of the agricultural sector and market access	<p>1. Foresight on market trends for regional priority agricultural commodities to enhance market-driven production provided.</p> <p>2. Integration of smallholder farmers into value chains and their capacity to access capital to invest in market-driven production supported.</p> <p>3. Value chain actors' access to technologies, innovations and management practices (TIMPs) improved.</p> <p>4. Participation of women and youths in commercialization and markets linkages improved.</p>
4.	Women, youth and social inclusion	<p>1. AR4D technologies and innovations specifically targeting women, youth and vulnerable groups developed and promoted.</p> <p>2. AR4D institutions supported to develop interventions that will increase participation of women, youth and other vulnerable groups in agricultural value chains.</p> <p>3. Principle of inclusiveness in the planning and execution of AR4D interventions</p>

		promoted.
5.	Knowledge and information management, communication and policy support; and	<p>1. Knowledge management hubs to foster collaboration and information sharing among various stakeholders in different countries created.</p> <p>2. Access to audience-specific agricultural knowledge and information through CCARDESA's ICKM and the Southern Africa Agriculture Information and Knowledge System (SAAIKS) enhanced.</p> <p>3. NARES institutions strengthened in information packaging and use of digital innovations and ICT with potential to transform agriculture.</p>
6.	Capacity strengthening of CCARDESA and AR4D institutions	<p>1. Regional AR4D agenda developed and foresight provided to AR4D institutions.</p> <p>2. Governance, management, funding and resource mobilization systems for CCARDESA strengthened.</p> <p>3. New strategic partnerships established and existing ones strengthened.</p> <p>4. AR4D institutions' programmes supported and managed efficiently.</p>

5. CONTENT ANALYSIS AND AUDIT FINDINGS

Both content analysis and content audit techniques were utilized. Content analysis was used to identify what concepts, themes and gaps exist on the CCARDESA knowledge hub while content audit was utilized to gauge content performance on the hub. A comparison of the content on the TFCA portal and the CCARDESA knowledge hub was also done.

5.1 CCARDESA's Knowledge system

CCARDESA has an active knowledge management system which was first developed in 2014 and has undergone a series of improvements over time. It has an active website and also leads an active social media component of communication which includes Twitter, Facebook and YouTube. This Knowledge Management (ICKM) system is regularly updated with news and knowledge products. Users have rated the system 3.5 on a scale of 1 to 5, with 5 being "very good".

The online analysis highlights that in the first half of 2019, there was a positive trend in the number of visitors to the website, indicating growing interest and engagement with the content. The data provided shows an increase of 3,108 additional visitors to the website during that period. More people downloaded documents from the website in 2019 than the previous year. This indicates that the website's content and resources were valuable and relevant to individuals across multiple countries within the SADC region. 660 knowledge products from SADC Member States and beyond were accessible to the visitors through the website. This included 134 CCARDESA-owned products and 512 curated content.

Further, the online analysis highlights the significant emphasis on climate change. The single most frequent word in the corpus was "Climate," appearing in 837 documents of the 1 188. The word "Climate" in the corpus, is always used in close proximity and context within other words like "Change, Smart, Agriculture, and Adaptation."

The table below shows the availability of other terms in the content. These terms were extracted as keywords from CCARDESA's six thematic areas, and scanned for within the content on the knowledge hub:

Table 4: Topics covered in the CCARDESA Knowledge hub

Term	Count / Documents	Proximate Terms	Correlation
Mobilization	114	Strategy, governance, management, resources, CCARDESA	
Capital	361	Experiences, process, institutionalization, working, approach	Climate, agricultural, CCARDESA, farmers
Disaster	192	Risk, management, climate; reduction, change	
Transboundary	123	Disease, pests, climate, risks, change	Climate
Environment	631	Social, management, climate, change, agricultural	
Natural process	352	Agriculture, management, food, sustainable, climate	Operationalized
Disease	447	Pests, management, climate, control	Regional, change; project, Africa, SADC
Value Chain	290	Actors, farmers, institutions, development, innovation	
Precision	57	Agriculture, farming, crop, platform, information	Change, SADC, regional, project, management
AR4D	130	Institutions, CCARDESA, capacity, agricultural, Programmes	
Trends	236	Climate, Africa, rainfall, agricultural, Southern	
Support	813	Development, CCARDESA, agricultural, regional, farmers	
Inclusion	217	Women, youth, climate, knowledge	
Market	658	Access, agricultural, farmers, production, information	
Emerging	245	Agricultural, risks, climate, change, resilience	
Storage	336	Processing, harvest, facilities, farmers	Regional, project, change, SADC, research

Grain	267	Yield, storage	Agricultural, project, SADC, regional
Harvest	373	Management, losses, maize, storage, practices	Project; Regional; Change; Research; Development
Coordination	488	Research, agricultural, development, centre, CCARDESA	Climate
Collaboration	402	Agricultural, research, development, management	Climate
Farm	438	Level, management, demonstration, crop, farmers	Change, regional, management, Africa, seed
Yield	369	Potential, maize, losses, benefits	Agricultural, regional, change, project, management
Variety	315	Seed, release, new, maize	Agriculture, change, Africa, management, development
Skills	359	Digital, training, knowledge, development	Climate
Youth	324	Groups, vulnerable, women, participation, agriculture	Climate
Nutrition	424	Food; Security, agricultural, productivity, agriculture	Climate
Gender	412	Development, climate, equality, youth	
Small holder	456	Farmers, agriculture, climate, production, farming	

Risks	419	Climate, change, resilience, emerging	
Innovations	258	Digital, practices, management, use, technologies	Climate
Adoption	544	Technology, dissemination, Technologies; Promotion; Agricultural	
Capacity	705	Building, development, CCARDESA, strengthening, research	
Policy	639	National, regional, development, SADC	
Training	623	Digital, agricultural, farmers, extension	

It is clear that climate-related issues have been a major focus within the content of the analyzed documents. The examination of proximate and correlating terms provides valuable insights into the specific topics covered and their relative importance within the knowledge hub.

5.2 INFORMATION ACCESSIBILITY

Based on the content analysis and audit conducted, it is evident that there are significant problems with the accessibility of CCARDESA's knowledge products and the visibility of its platform in search engine results. The CCARDESA website is not appearing in search results when the target audience searches for similar content, indicating that there are more significant issues with its search engine optimization (SEO) and visibility.

5.3 INFORMATION READABILITY

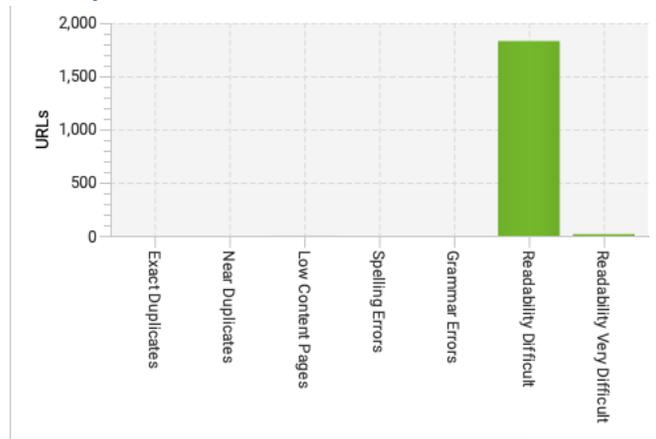
Research has indicated that there are 5622 URLs or pages making up the CCARDESA knowledge hub. Based on the classification of the URLs or pages in terms of ease of readability, here is a breakdown:

Table 5: Readability and number of URLs

Very Hard	Hard	Fairly Hard	Normal	Fairly Easy	Easy	Very Easy	Uncategorized
16	1921	1946	354	110	44	3	1228

It is clear from the table above that the readability of the content on the CCARDESA knowledge hub falls in the categories of hard, fairly hard and uncategorised as further demonstrated by the below figure. Readability is therefore classified as difficult.

Fig. 1: Readability and number of URLs

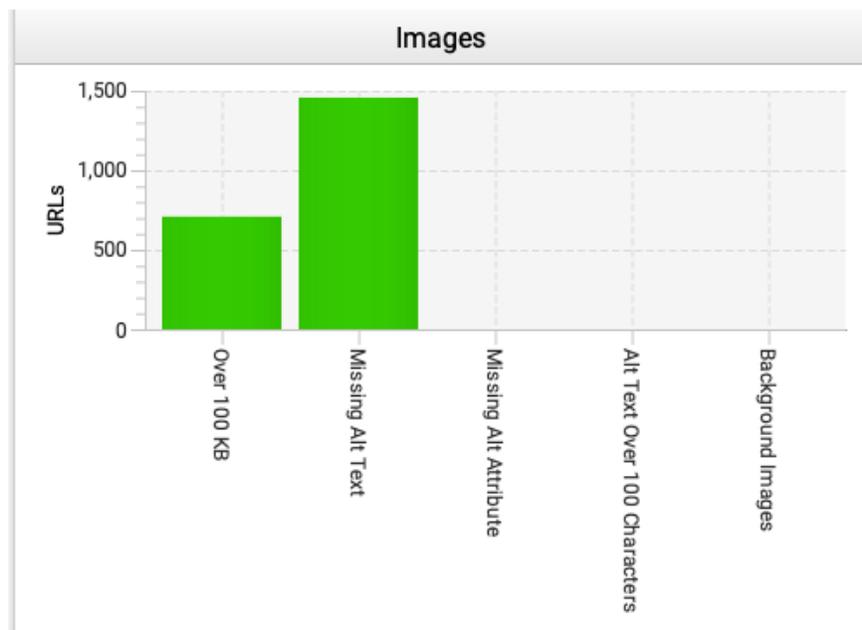


5.4 User experience

The knowledge hub does not have cookies which are crucial in improving user experience especially in form filling. The first time when a user downloads a knowledge product, they will fill in form and the portal will remember them and provide auto fill and thus enhancing user experience.

Figure 2 below indicates that alt text and key words are missing. The absence of alt text and keywords significantly impacts accessibility, search engine visibility, and overall user experience.

Fig. 2: Missing alt text and key words



5.5 SOCIAL MEDIA ACCOUNTS

CCARDESA has very low engagement and following in all their social media platforms - LinkedIn 405 followers, YouTube 71 subscribers and 33 videos, Facebook 3.053 followers, Twitter 73 followers and only joined in March 2022, and TikTok, zero. These statistics are concerning considering how social media plays a pivotal role in organizations reaching their objectives. Audio visuals reach the end user faster than reading ever would and this is one element of focus to be addressed through this study.

5.6 TFCA PORTAL

SADC Trans-frontier Conservation Areas (TFCAs) is a mechanism that delivers on the implementation of SADC Protocols, Strategies and Programmes related to the conservation and sustainable utilisation of natural resources. TFCA's approach is based on three pillars, namely:

- I. Environmental Conservation by supporting the integrity of large ecosystems and the sustainable use of natural resources;
- II. Regional Integration by bringing together two or more Member States to co-manage shared natural resources and progress towards legal harmonisation and active cooperation in resolving other matters related to transboundary conservation; and
- III. Socio-economic development mainly of the areas and communities affected by the establishment of TFCAs.

The SADC TFCA has a portal that mainly focuses on the following thematic areas;

- I. Agriculture (livestock, crop production, aquaculture, bee-keeping, etc);
- II. Climate Change (adaptation, mitigation, finances, etc);
- III. Natural Resource Management (protected area management, habitat management, species management and law enforcement, forestry resources, marine resources, freshwater resources, etc), and;
- IV. Tourism (hospitality, guiding, marketing and management)

6. RECOMMENDATIONS

6.1 Information accessibility

CCARDESA can increase the chances of its platform being discovered by the target audience, including farmers and other stakeholders by implementing effective search engine optimization (SEO) strategies. Steps such as keyword research, on-Page Optimization, technical SEO, content optimization, link building among others to optimize the website and its content can be implemented to improve accessibility.

6.2 Information Readability

It is crucial that CCARDESA regularly monitor website traffic, user behavior, and keyword performance using tools like Google Analytics. This will provide valuable insights to refine the SEO strategy, identify areas for improvement, and measure the effectiveness of optimization efforts. Optimizing the website and its content for search engines is crucial to improve its visibility and ensure that it appears in the top search results.

6.3 CCARDESA's Social media accounts

It is essential to focus on the quality of engagement and the potential reach of the accounts. Some considerations are to:

6.3.1: Utilize Hashtags and Trending Topics: The accounts need to stay updated on relevant hashtags and trending topics in the agricultural and rural development sectors. Incorporate these hashtags strategically into tweets to increase the visibility of CCARDESA's content and connect with broader conversations happening in the online community. It is also important to collaborate and participate in conversations and discussions by mentioning and tagging relevant accounts.

6.3.2: Both Twitter and Facebook accounts rely heavily on text content for information. Posting more interactive multimedia content on social media platforms can greatly enhance engagement and capture the interest of the target audience. By incorporating a variety of multimedia elements, such as videos, images, infographics, and interactive tools, CCARDESA can deliver information in a more engaging and visually appealing manner.

6.4. TFCA content to reflect on the CCARDESA knowledge hub

CCARDESA knowledge hub adequately covers content on climate change and agriculture. There is therefore need to create content on natural resources management, and tourism. Specific knowledge products can be on the following thematic areas: wildlife conservation, conflicts between wildlife and human life, and forestry. All these topics are derived from TFCA's 3rd thematic area: Natural Resource Management (protected area management, habitat management, species management and law enforcement, forestry resources, marine resources, freshwater resources, etc.). Knowledge products on tourism should cover topics on hospitality, guiding, marketing and management.

6.5 Types of knowledge products on the website and focus on target audiences

The new pieces of content should be more specifically addressed to farmers, women, youth and vulnerable groups. CCARDESA therefore needs to generate knowledge products that address the technical challenges faced by farmers and value chain actors for purposes of improving production and productivity. The knowledge products need to be gender sensitive and inclusive of the need to increase the participation of youth in the agricultural value chain as well as catering for the special needs of women and vulnerable groups. The resultant information and knowledge products should therefore be packaged for these different audiences and used to promote increased adoption of research results. The products must focus on long-term mind-set strategies to assist the farmers and other value chain actors to change their approach and adopt business approach in agriculture. Also critical to this process is the capacitation of Information, Communications and Knowledge Management (ICKM) focal points in SADC Member States.

There is also a need to reclassify and rename categories of the knowledge products on the hub. Not all products are knowledge products. As such, the classifications and categories need to be renamed in order to best define what each piece of content is. Possible classification suggestions include best practices, news articles, best bet, etc.

When developing knowledge products, it is essential to have a specific target audience in mind. Tailoring the content to meet the needs and interests of a select few audiences can greatly enhance its relevance and effectiveness. It is therefore recommended that CCARDESA use Audience-

Centric Language and Tone. Tailor the language, tone, and style of the knowledge products to match the preferences and characteristics of the target audiences. Use terminology, examples, and illustrations that resonate with them and make the content more relatable and accessible.

6.6. Broadening CCARDESA's themed content base

There is need for CCARDESA to prioritize the other thematic areas through demand driven research. Apart from the current focus on improving agricultural productivity, food and nutrition security due to climatic change. Themes such as; sustainable management of natural resources, resilience to other emerging agricultural risk, increased commercialization and access to markets for the agricultural sector, especially for smallholder farmers, and increased participation of youth, women, girls and vulnerable groups in agricultural value chains, need to be extensively covered in the knowledge products.

CCARDESA needs to continue strengthening the AR4D institutions by implementing thematic strategies for each thematic area that will ensure that research investments are aligned to regional and national development priorities.

CCARDESA must prioritize the following specifically outlined aspects from the thematic areas:

- I. Sustainable utilisation of agricultural production resources,
- II. Application of digital and artificial intelligence for agricultural production,
- III. Sustainable management of natural resources,
- IV. Wildlife conservation,
- V. Conflicts between wildlife and human life,
- VI. Forestry: timber and non-timber forest products,
- VII. Fisheries,
- VIII. Wide range crop production,
- IX. Resilience to emerging agricultural risks,
- X. Increased commercialization and access to markets for the agricultural sector (especially for smallholder farmers) and;

- XI. Increased participation of youth, women, girls and vulnerable groups in agricultural value chains

6.7 Types of ICT-based (audio-visual) knowledge products that CCARDESA can develop to increase audience engagement

The increasing role of Information, Communication and Technology (ICT) in Agriculture has been shaping CCARDESA's business landscape as well as influencing its actions and priorities. CCARDESA needs to maximize the use of ICT tools and artificial intelligence as the cornerstone of production and marketing efficiency in agriculture. CCARDESA can be an active participant in using these tools to improve the performance throughout the value chain.

Table 6 below presents a list of 16 proposed knowledge products to be developed under this assignment. These proposed knowledge products cover a wide range of topics aimed at reaching the different target audiences. Each product will be 4-6 minutes in length. The products will be focused and will provide valuable information in a digestible format. The two-week timeframe assigned for research, production, and packaging ensures a relatively quick turnaround for each episode as well as allowing for a steady release of the content.

It is important to note that these timelines are approximate and may vary depending on the complexity of the topic, availability of resources, and production capabilities. Adhering to the timeline will require efficient coordination, effective research and streamlined production processes.

Table 6: 16 Knowledge products to be developed

KP	Thematic Area	Areas to be covered
1.	Wildlife conservation	<ul style="list-style-type: none"> a) Promoting wildlife-friendly farming practices like agroforestry b) Promoting sustainable wildlife tourism initiatives that generate economic benefits for local communities while minimizing environmental impacts
2.	Sustainable utilisation of agricultural production resources	<ul style="list-style-type: none"> a) Utilizing precision agriculture technologies to maximize nutrient adoption and reduce environmental impacts b) Use of energy-efficient practices in Agricultural Production such as renewable energy sources
3.	Application of digital and artificial intelligence for agricultural production	<ul style="list-style-type: none"> a) Technology adoption by Farmers: Use of Robotics and Drones to advance and Improve Agriculture b) Digitalization of agriculture: Use of Digital Platforms and mobile applications for farm management, record-keeping and data analysis
4.	Forestry	<ul style="list-style-type: none"> a) Sustainable integration of forest-based agriculture to enhance food security and support local communities b) Collaboration and coordination between forestry and agricultural sectors for sustainable land use c) Promotion of sustainable harvesting of non-timber forest products

5.	Fisheries	<ul style="list-style-type: none"> a) Aquaculture and fish farming: Examining the growth and potential of aquaculture as a means to supplement wild-caught fish production b) promoting responsible and sustainable fish farming practices to minimize environmental impact and over-fishing
6.	Market Access	<ul style="list-style-type: none"> a) Increased commercialization and access to markets for the agricultural sector (especially for smallholder farmers) b) Identifying Challenges that limit farmers to market access c) Upscaling smallholder farmers through knowledge dissemination and supportive policies
7.	Increased participation of youth, women, girls and vulnerable groups in agricultural value chains	<ul style="list-style-type: none"> a) Initiatives to empower vulnerable groups towards active participation in Agriculture b) Empowering Women smallholder farmers to be active and take leadership roles in the Agri-business sector. c) Cultivating Passion in youth agriculture participation d) Highlighting success stories of women and young entrepreneurs in agriculture
8.	Sustainable Tourism	<ul style="list-style-type: none"> a) Cultural heritage preservation: The role of sustainable tourism in preserving and promoting local cultural heritage and

		traditions
9.	Resilience to emerging agricultural risks	<ul style="list-style-type: none"> a) Adopting climate-smart agricultural practices that enhance resilience to climate change impacts b) Investment in farmer training programs, workshops, and knowledge-sharing platforms to build resilience and enhance adaptive capacity
10.	Value chain expansion and exploration	<ul style="list-style-type: none"> a) Identifying niche markets, export potential, and new customer segments in agriculture b) Exploring partnerships or collaborations with key stakeholders along the supply chain to streamline operations and reduce costs.
11.	Conflict between wildlife and human life	<ul style="list-style-type: none"> a) Human-wildlife Conflict Mitigation efforts at Community level b) Strategies and actions for sustainable coexistence of wildlife with human activities
12.	Improving Access to Education and promoting entrepreneurship and business management in Agriculture	<ul style="list-style-type: none"> a) Discussing the challenges farmers face in accessing financing for their agricultural enterprises. b) Creating market access and creating linkages between farmers and buyers, both local and international. c) Showcasing successful examples of public-private partnerships in the agricultural sector

13.	Marketing and Branding in Agri-business	<ul style="list-style-type: none"> a) Identifying gaps in market visibility, promotional activities and customer engagement b) Assessing the effectiveness of agribusiness's marketing strategies and brand positioning
14.	Human Resources and Skills Development in Agribusiness	<ul style="list-style-type: none"> a) Evaluating skill set and capacity of workforce in relation to the needs of agribusiness b) Identifying gaps in employee training and development programs
15.	Importance of Post-harvest Management	<ul style="list-style-type: none"> a) Sustainability in agro-processing: Implementing eco-friendly practices and reducing environmental impact b) Discussing the impact of post-harvest losses on food security
16.	Sustainable Natural Resources Management	<ul style="list-style-type: none"> a) Exploring the integration of traditional knowledge with modern science for sustainable resource management. b) Highlighting the importance of international agreements, policy frameworks to address climate changes.

It is also proposed that the 3 countries and themes to be covered are:

Table 7: Proposed countries and themes to be covered

Country	Themes to be covered
Namibia	Meat processing, fish processing, agro processing, dairy products, cattle, wildlife and tourism
Eswatini	Forestry (timber value chain products), Sugar plantations and manufacturing, Pineapple production and value chains
Mozambique	Fisheries value chains Cashew nuts value chains and women in agriculture

However, it suffices to state that the final decision lies with CCARDESA and the production crew will rely on CCARDESA network with the subjects in the selected countries.

6.8 Dissemination of the new ICT-based (audio-visual) knowledge products

Firstly, CCARDESA needs to develop digital and ICT-Based (Audio Visual) knowledge products that will ensure that all agricultural value chain actors have adequate information for decision making and action. The dissemination of these knowledge products should result in intermediate outcomes at the local community level.

As such, a number of dissemination activities must be used to engage with the different value chain actors so as to stimulate a shift away from subsistence approaches and assist the players to see room for growth. The activities should include the use of existing national and regional platforms which have an important role to play in the development of value chains and in stimulating mind set changes. Dissemination can thus be done through various ICT technologies (such as computers,

laptops, smart phones, tablets, mobile apps, messenger apps, the internet, social media etc.), traditional media (TV, Radio and Print), electronic media and various outdoor activities for researchers, extension agents, farmers and other various stakeholders.

Further, in facilitating effective dissemination, CCARDESA must alert key stakeholders, especially the ICKM focal persons, on the projects in their various countries. CCARDESA also needs to develop a communication plan to guide ICKM focal persons in undertaking their mandates of enhancing knowledge management for advocacy and decision support and communication at national level. Knowledge sharing and communication needs to be improved by translating technical scientific knowledge into simple language understandable by farmers. Value chain actors must be encouraged to hold seminars to educate others with the value of information and knowledge in their various institutions.

There should also be an improvement in the appointments of ICKM focal point persons in the member countries in order to enhance the sharing of information and knowledge in the region. CCARDESA needs to share more information with countries and increase its visibility. There is need to increase the efforts of getting in touch with various countries and agencies to teach the public how science can help them in agriculture. Knowledge translation is also key to allow for the public to understand the issues. CCARDESA must continue enabling its stakeholders to communicate more with the public especially that it has been noted that the implementation of the ICKM strategy has been a challenge. In addition, CCARDESA must endeavor to localize content that is shared with the member states. This information must then be written, published and shared for use by the public.

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