NAMIBIAN
AGRONOMIC BOARD

CROP VALUE CHAIN DEVELOPMENT STRATEGY

2025-2030

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ACRONYMS & INITIALISMS

AfCFTA	African Continental Free Trade Area
AGOA	African Growth and Opportunity Act
AI	Artificial Intelligence
AM	Angolan Mopane
AMTA	Agro-Marketing and Trade Agency
APA	Agronomic Producers Association
AU	African Union
BSD	Business Scouts for Development
CA	Conservation Agriculture
CAADP	Comprehensive Africa Agriculture Development Programme
CAGR	Compound Annual Growth Rate
CPPI	Container Port Performance Index
CVCDS	Crop Value Chain Development Strategy
DALRRD	Department of Agriculture, Land Reform and Rural Development (South Africa)
DAPEES	Directorate of Agricultural Production Extensions and Engineering Services
DARD	Directorate Agricultural Research and Development
DRC	Democratic Republic of the Congo
EC	European Commission
ECB	Electricity Control Board
EU	European Union
EU-EPA	European Union – Economic Partnership Agreement
FPBH	Fresh Produce Business Hubs
FTA	Free Trade Agreement
GAP	Good Agricultural Practices
GDP	Gross Domestic Product
GHS	Globalized Harmonised System
GIZ	Deutsche Gesellschaft für Internationale Zusammenarbeit
GM	Genetically Modified
GMA	Gross Margin Analysis
GMO	Genetically Modified Organism
GSP	Green Scheme Policy
GVP	Gross Value of Production
Ha	Hectare
HPP	Harambee Prosperity Plan
HS	Harmonized System
ICT	Information Communication Technologies
IFOAM	International Federation of Organic Agriculture Movements
KAB	Kalahari Acacia-Baikiaea
km	Kilometres
KX	Kalahari Xeric
M&E	Monitoring and Evaluation
MAWF	Ministry of Agriculture, Water and Forestry
MFPE	Ministry of Finance and Public Enterprise
MAWLR	Ministry of Agriculture, Water, and Land Reform
MEFT	Ministry of Environment Tourism and Forestry
MHETI	Ministry of Higher Education, Technology and Innovation
MHAISS	Ministry of Home Affairs, Immigration, Safety and Security
MLIREC	Ministry of Labour, Industrial Relation and Employment Creation
MWT	Ministry of Works and Transport
MSP	Market Share Promotion
MT	Metric Tonne
NAISA	Namibia Agricultural Input Suppliers Association
NAB	Namibian Agronomic Board
NAHOP	National Association of Horticulture Producers
NAMSIP	Namibia Mechanization Seed Improvement Programme
NAP	National Agriculture Policy
NATFP	Namibian Association of Traders in Fresh Produce
NBC	Namibian Broadcasting Corporation
NCA	Non-Commercial Area
NDP	National Development Plan
NNF	Namibian Nature Foundation
NOA	Namibian Organic Association
NPC	National Planning Commission
NPRSTI	National Programme on Research, Science, Technology, and Innovation
NSA	Namibian Statistics Agency
NSFR	National Strategic Food Reserve
NTB	Non-Tariff Barrier
NTSIP	Revised National Science, Technology and Innovation Policy
N$	Namibian Dollar
OABS	Optimal Agricultural Business Systems
OMA	Open Market Outlets
OR	Orange River
PGS	Participatory Guarantee System

LIST OF ACRONYMS & INITIALISMS

POPA	Potato and Onion Producers Association
PPP	Public-Private Partnership
RAP	Regional Agricultural Policy
RN	Republic of Namibia
RSA	Republic of South Africa
RoW	Rest of World
R&D	Research and Development
SADC	Southern African Development Community
SAFEX	South African Futures Exchange
SAFN	Southern Africa's Freight News
SDG	Sustainable Development Goal
SME	Small- to Medium-Sized Enterprise
SOE	State-Owned Enterprise
SPS	Sanitary and Phyto-Sanitary
SSA	Sub-Saharan Africa
STEM	Science, Technology, Engineering and Mathematics
STI	Science, Technology and Innovation
SWAPO	South-West Africa People's Organisation
SWOT	Strengths, Weaknesses, Opportunities, and Threats
TVET	Technical Vocational Education and Training
t/ha	Tons per hectare
UAE	United Arab Emirates
UK	United Kingdom
UNAM	University of Namibia
UPOV	International Union for the Protection of New Varieties of Plants
USA	United States of America
US$	United States Dollar
VAT	Value-Added Tax
WHO	World Health Organization
WTO	World Trade Organisation
ZB	Zambezian Baikiaea

FOREWORD BY THE CHAIRPERSON

It is with great pride and a profound sense of responsibility that I present the Namibian Agronomic Board's (NAB) Five-Year Crop Value Chain Development Strategy (CVCDS) 2025–2030. This strategy represents a pivotal step in our national journey toward building a resilient, self-sufficient, and globally competitive crop industry. It is both timely and fully aligned with Namibia's overarching policy frameworks, including *Vision 2030, the draft Sixth National Development Plan (NDP6), the SWAPO Party Manifesto, the Strategy for the Transformation of the Agri-Food Sector (STAS), and the draft strategic framework of the Ministry of Agriculture, Water, Fisheries and Land Reform (MAWFLR).* These national development plans collectively emphasize agricultural value chain development as a driver of food security, economic growth, and employment creation.

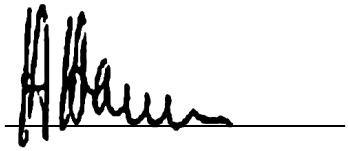
At the institutional level, this strategy directly supports the achievement of the performance targets set out in the NAB's *Integrated Strategic Business Plan (ISBP) 2025–2030.*

Over the years, the NAB has evolved significantly, from a traditional regulatory authority into a progressive enabler of market access and sectoral growth. Initiatives such as the Horticulture Market Share Promotion (MSP) scheme and the Grain Marketing Mechanism have contributed meaningfully to the development of local markets. However, challenges persist. Climate variability and a high dependence on imported fruits and grains continue to undermine the full potential of our crop sector.

The CVCDS introduces a bold and proactive shift in our approach, moving from reactive market protection to a comprehensive, end-to-end value chain development model. The strategy seeks to address critical gaps across the crop production ecosystem, including input supply, skills development, infrastructure, financing, agro-processing, and market/trade linkages. It prioritizes key crops such as citrus, bananas, mangoes, grapes, avocados, blueberries, potatoes, nuts, wheat, white maize, pearl millet, rice, and sugarcane, crops with high potential to reduce import dependency, improve trade balances, and drive inclusive economic growth. As a testament to the Board's full commitment, we have restructured core functions within the NAB to enhance our focus on research, innovation, and investment mobilisation. Furthermore, the Board has committed an initial N$250 million from its reserves to kickstart implementation. This is more than a financial investment, it is a clear declaration of intent and leadership.

I extend my sincere gratitude to all stakeholders who generously contributed their expertise and perspectives in the development of this strategy. Your input has been invaluable in shaping a robust and forward-looking roadmap for the sector.

Now is the time for collective action. Let us move forward, public and private sectors, producers and processors, researchers and investors, united in our mission to transform Namibia's crop value chains into engines of sustainable development.



HUBERTUS HAMM
CHAIRPERSON
NAMIBIAN AGRONOMIC BOARD

FOREWORD BY THE CHIEF EXECUTIVE OFFICER

The launch of the Five-Year Crop Value Chain Development Strategy (2025–2030) represents a bold and forward-looking step in the Namibian Agronomic Board's ongoing efforts to transform agriculture into a catalyst for inclusive growth, food security, and climate resilience. This strategy offers a comprehensive framework to unlock the full potential of Namibia's crop industry—not merely through production, but by strengthening every link of the value chain, from inputs to international trade.

Our recent analysis of the sector underscored persistent challenges: high import dependency, limited access to quality inputs, inadequate investment in processing and logistics infrastructure, and fragmented market systems. These issues, compounded by climate variability, continue to limit the sector's contribution to national development. In direct response, this strategy is designed to foster systemic change—through innovation, integration, and investment.

What distinguishes the CVCDS is its holistic and inclusive approach. It prioritises key crop clusters—such as citrus, bananas, mangoes, blueberries, and potatoes—based on market potential, agro-ecological viability, and their capacity to reduce import bills while enhancing export opportunities.

Importantly, this strategy is built on a foundation of collaboration. We engaged extensively with producers, agribusinesses, academia, and government partners to ensure that the priorities outlined are both practical and transformative. At the institutional level, the NAB has restructured internally to sharpen our focus on value chain development and has committed an initial N$250 million in catalytic funding to kickstart implementation.

In driving this strategy forward, we are also guided by our collective responsibility to steward the land for future generations. As such, allow me to share a guiding reflection:

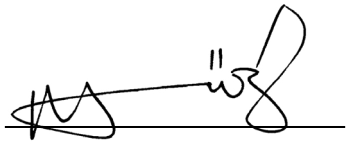
"Rain may nourish the land, but it is the stewardship of humanity that ensures crops thrive, not just today, but for generations to come"

This sentiment captures the essence of what we aim to achieve—a crop industry that is not only economically viable but also socially inclusive and environmentally sustainable.

To all stakeholders: this is our moment to align vision with action. The CVCDS is not merely a strategy; it is a platform for coordinated impact. Let us pool our resources, expertise, and commitment to realise a Namibia where agriculture is a pillar of prosperity and resilience.

Together, we can build a thriving, competitive, and food-secure nation—rooted in sustainability and driven by shared purpose.

I Thank You !



DR. FIDELIS N. MWAZI (PhD)
CHIEF EXECUTIVE OFFICER
NAMIBIAN AGRONOMIC BOARD

01

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

This Five-Year Crop Value Chain Strategy and Implementation Plan (CVCDS)(2025/2026 to 2029/2030) for the Namibian Agronomic Board (NAB) was developed through desktop research, consultations, and workshops with all relevant stakeholders in the crop value chain.

The outlay of the crop value chain strategy and implementation plan is as follows:

The opening section provides an executive summary.

- *Section Two* articulates the core tenets guiding the NAB, delineating its mandate, vision, mission, and core values. With a primary objective to foster Namibia's agronomic industry, the NAB envisions becoming a world-class regulator overseeing a diverse and sustainable crop sector. Positioned as a key facilitator, the NAB aims to create a conducive environment for controlled product production, processing, storage, and marketing. Through adherence to these principles, the NAB strives to elevate Namibia's crop industry to international standards of excellence, thereby ensuring its vitality and resilience for sustained growth.

- To set the scene, *Chapter Three* gives an overview of the Namibian crop subsector. Namibia is geographically divided into seven production zones, each characterised by distinct climatic and ecological patterns. The section underscores the impact of these variations on crop production and trade within the country. This section delves into Namibia's agricultural landscape, focusing on key products such as wheat, fruits (specifically dates, table grapes, and blueberries), citrus fruits, and vegetables (potatoes, carrots, onions, and tomatoes).

- Cereal crops such as white maize, pearl millet *(mahangu),* wheat, and sunflower constitute the limited agronomic varieties due to the challenging climatic conditions. Despite being staples in the national diet, Namibia faces the necessity of importing these crops to meet domestic demand.

  The report sheds light on the potential for expanding fruit production, with only 15% of the total available land for fruit production currently utilised. Notably, the South and Orange River production zones excel in table grape and date production, facilitating high-value exports. However, the overall domestic market share for fruits remains at 4%, thus indicating a considerable gap between production and local consumption.

  In the vegetable sector, the report examines the production, consumption, and trade dynamics of potatoes, carrots, onions, and tomatoes. While Namibia produces 50% of its potato demand locally, challenges persist in the onion sector, with annual oversupply during the production season and shortages during the off-season. Positive trade balances for onions and tomatoes signal export opportunities, with tomato exports surpassing onion exports in value since 2011.

  Moreover, the analysis of trade balances for major agronomic crops from 2002 to 2022 reveals a consistently negative trade balance, indicative of Namibia's inability to sufficiently supply its domestic market without significant dependence on imports. The report also examines trade balances specifically for controlled agronomic crops, demonstrating persistent negativity or neutrality from 2012 to 2022.

- *Chapter Four* presents a comprehensive SWOT analysis of Namibia's agricultural sector, specifically the crop sub-sector, emphasising the strengths, weaknesses, opportunities, and threats across different value chain levels. The analysis incorporates diverse perspectives from stakeholders, thereby providing a nuanced understanding of the challenges and potential avenues for growth. Capacity constraints are also identified and discussed. In summary, the findings highlight the multifaceted challenges and opportunities within Namibia's crop subsector.

- *Chapter 5* defines the crop sector strategic framework and aligns it with Namibia's National Development Plan 5 (NDP 5) (2017-2022) and the Harambee Prosperity Plan (HPP II) (2016-2025), which are crucial governmental blueprints guiding socioeconomic development. While NDP 5 focuses on sustainable development across sectors, HPP II emphasises economic diversification, job creation, infrastructure development, food security, and poverty alleviation.

- *Chapter Six* delves into the strategic interventions for each value-chain position (input, production, processing, marketing and trade) and targeted interventions on smallholder farmers' development, research and development, along with strategic interventions from industry and other stakeholders identified through extensive stakeholder consultations. For specialised crops, Zambezi, Karst, and North Central have the potential for expanding certain fruit production. Prioritization based on agroecological characteristics, soil and water requirements, and crop suitability indicates high-priority crops for each zone, which is summarised in Table 6-10.

- In *Chapter Seven,* the implementation plan unpacks actions and targets associated with strategic interventions for the following value chain positions, i.e., inputs, production, processing, marketing, and trade for smallholder farmer development and research and development.

- *Chapter Eight* discusses critical success factors for the successful implementation of the Five-Year Crop Value Chain Strategy and Implementation Plan.

- A funding model is proposed in Chapter Nine, and lastly, a monitoring and evaluation framework is proposed in Chapter Ten.

02

ORGANISATIONAL MANDATE AND STRATEGIC FRAMEWORK

This section sets out the Namibian Agronomic Board's mandate, vision, mission, and core values.

2.1 NAB MANDATE

To promote the agronomic industry and to facilitate the production, processing, storage and marketing of controlled products in Namibia.

2.2 NAB VISION

A globally recognised regulator of a sustainable, agile and innovative agronomy and horticulture sector.

2.3 NAB MISSION

To advance the development of the agronomy and horticulture sector through effective regulation and facilitation

2.4 NAB CORE VALUES STATEMENT

INTEGRITY

We uphold open and honest communication and conduct ourselves in a trustworthy manner, as well as ensuring that our actions match our values and principles on a day-to-day basis.

ACCOUNTABILITY

We pride ourselves in being good stewards of all the resources that we have been entrusted with. We assume full ownership and responsibility of all our actions and always behave in an open and transparent manner towards our internal and external stakeholders.

INCLUSIVITY

We believe in comprehensive industry consultations. In our regulatory and advisory role, we have a deep belief that cooperation and integration will greatly strengthen stakeholders and bring benefits to all. We shall embark on a wide-ranging consultative process to broadly take note of industry's needs in what we are assigned to do.

AGILITY

We believe in adaptability and responsiveness to changes in the environment we operate in while maintaining the ability to achieve optimal outcomes.

SUSTAINABILITY

We commit to practices that ensure long term growth balancing economic, social and environmental considerations for positive impact on the community and future generation.

INNOVATION

We believe in creative thinking and continuous improvement to develop new solutions, processes and services that enhance our effectiveness and deliver value to our stakeholders.

2.5 NAB STRATEGIC MAP

Figure 3 1 shows the NAB's Strategic Map as per the 2025/2026 – 2029/2030 Integrated Business and Financial Plan (ISBP). The CVCDS aligns with the organisation's high-level statements and vision by setting clear strategic themes, objectives, and priorities that reflect the core values and mission of the NAB, as reflected in the ISBP.

The CVCDS is aimed to enhance the performance of the NAB to drive the growth of the Agronomy and Horticulture industry for the period between 2025/2026 and 2029/2030.

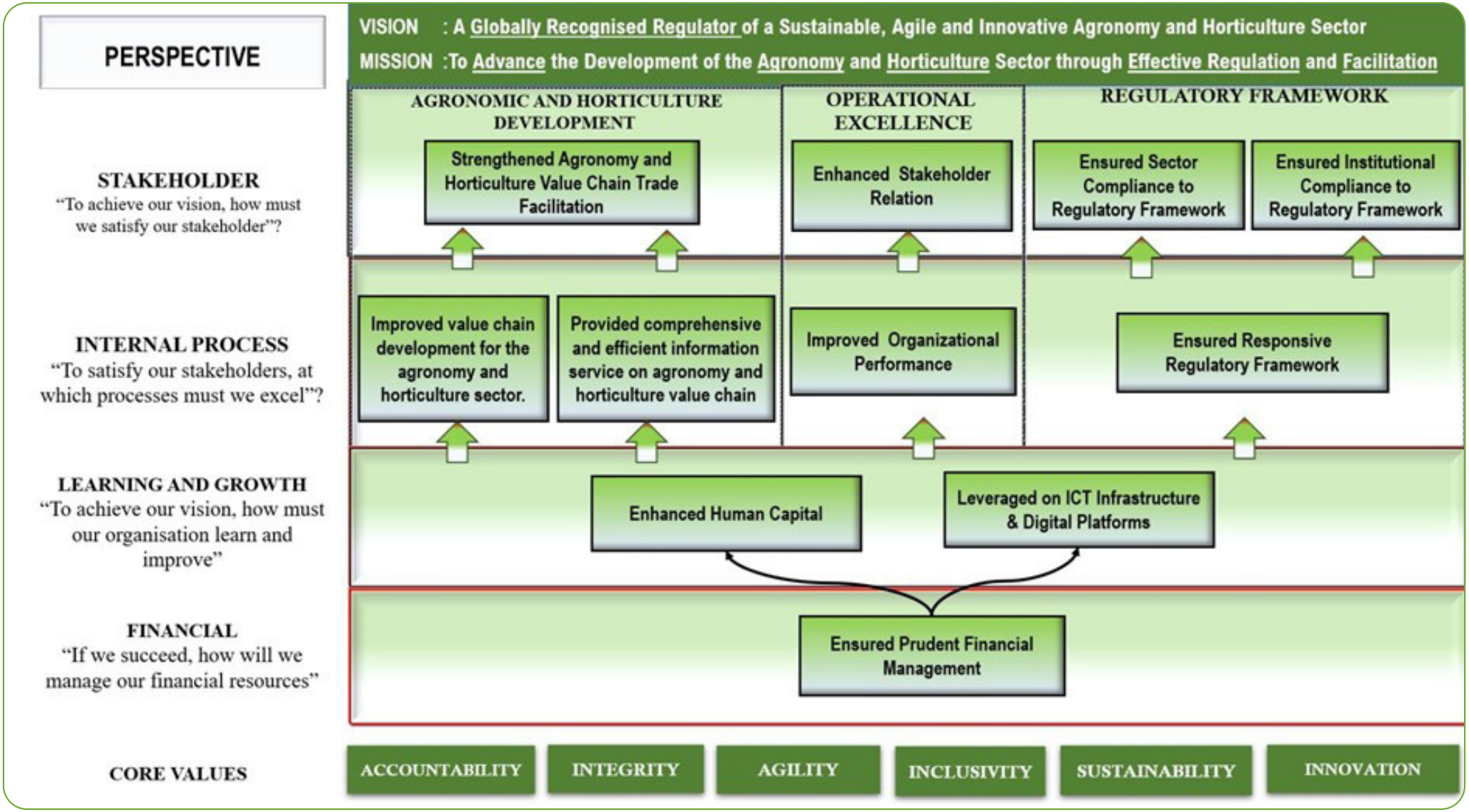


Figure 3 1: Namibian Agronomic Board's Strategic Map as per the 2025/26 to 2029/30 ISBP.
Source: NAB (2025a)

03

OVERVIEW OF THE CROP SUBSECTOR IN NAMIBIA

3.1 AN INTRODUCTION TO NAMIBIA'S CROP SUBSECTOR

3.1.1 Agronomic (grain) subsector

Due to the arid climate and mostly unfavourable farming conditions, Namibia's agronomic crop variety is rather limited. Cereal crops include white maize, pearl millet, wheat and sunflower. These cereals are staples of the national diet. While these crops are locally produced, imports are necessary to meet the national demand.

During the 2021/2022 marketing season, a total of 90,895 tons of white maize and 18,462 tons of wheat were marketed from the 1st of May to the 31st of March 2022 (NAB, 2023c). Namibia remains a net importer of cereals, with imports accounting for two-thirds of domestic consumption (Sartorius von Bach & Kalundu, 2022).

- **Pearl Millet**

  Pearl millet is a staple crop and a vital food source for most Namibians living in the northern and north-eastern regions. It is mainly produced for household consumption, and the remaining grain that is not consumed is marketed (NAB, 2017). During the 2021/2022 marketing season, only 1,985 tons were marketed through the formal market compared to 4,139 tons during the 2020-2021 season (NAB, 2022f).

  To support an increase in production, establish a sustainable marketing system and develop supporting industries for the grain sector, pearl millet was gazetted as a controlled crop on 15th May 2008 under the Agronomic Industry Act of 1992.

- **White Maize**

  Namibia produces white maize both under irrigation and rain-fed cultivation in the Zambezi, Kavango, North Central, Karst, Central and South production zones. Commercial production is centred in the Maize Triangle (Tsumeb, Grootfontein, and Otavi)

  White maize is exclusively produced for human consumption, and it is gazetted as a controlled crop whereby the marketing of locally produced white maize grain is managed through the White Maize Marketing Agreement signed between organised producers and millers and facilitated by the Namibian Agronomic Board (NAB).

  Usually, imports of maize are restricted during the marketing period which usually commences from 01 May each year and is only allowed after all the locally available marketable maize has been sold and partially milled (NAB, 2022b). Figure 3 1 and Figure 3 2, respectively, show maize production trends in Namibia and give an overview of the trade in white maize.

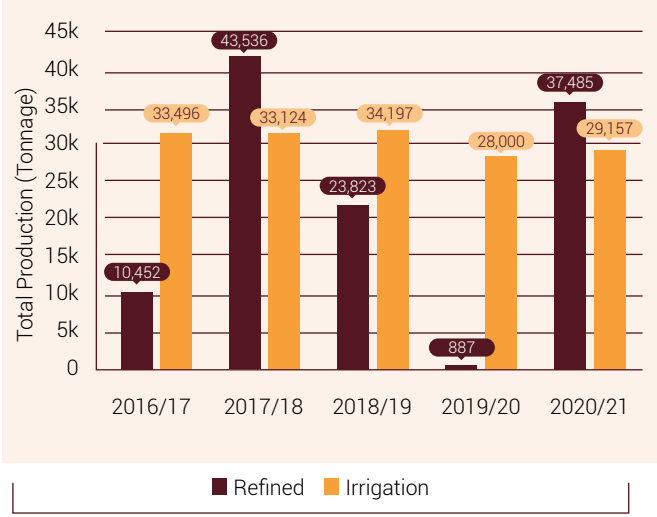


Figure 3.1: White maize production trends
Source: NAB (2022d)

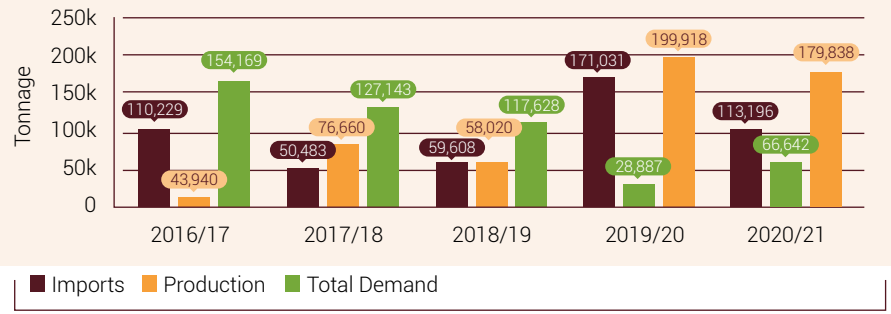


Figure 3.2: Namibian white maize trade overview
Source: NAB (2022d)

- **Wheat**
  Namibian wheat is produced totally under irrigation. Figure 3 3 shows that the total local production of wheat during 2019/2020 marketing season was 4 466 tons, while the imports stood at 114 363 tons. This means that only 4% of the local demand was met through local production during that marketing year.

Figure 3 3 also indicates that a reduction in local wheat production was recorded during the 2019/2020 marketing season compared to the previous years. This could be attributed to the drought experienced in the previous years.

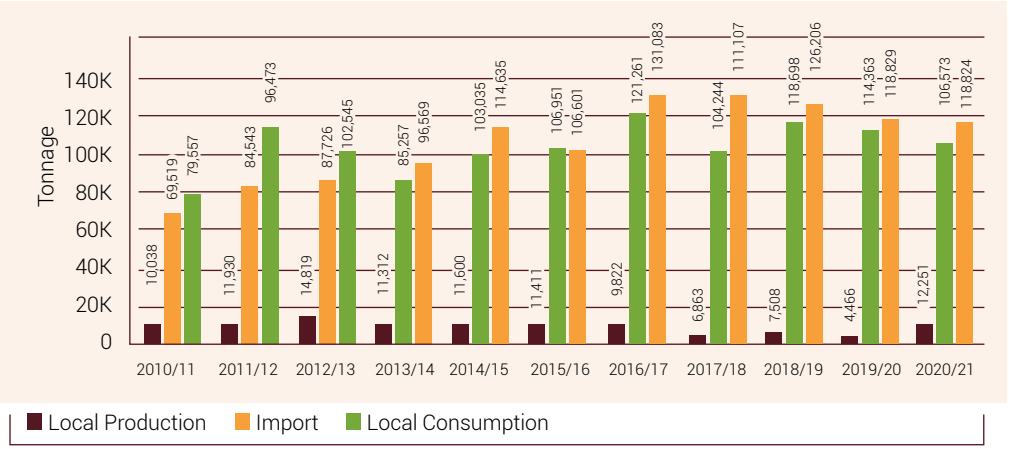


Figure 3.3: Wheat: Local production, imports and local consumption
Source: NAB (2021)

For the 2020/2021 marketing season, domestic wheat production was estimated at 12 251 tons, and this was more than double when compared to the 2019/2020 (4 666 tons) marketing season. The increase in production was only sufficient to meet 11% of the total domestic demand, with 89% (106 573 tons) of the wheat being imported.

3.1.2 Horticulture subsector

The horticulture subsector covers fresh fruit and vegetable produce. Trade performances are summarised in Figure 3 4.

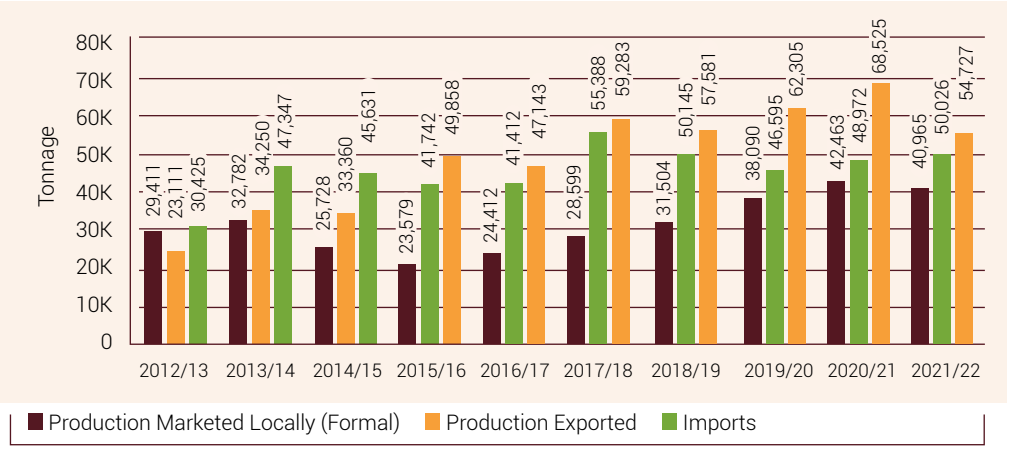


Figure 3.4: Horticulture trade performance (tonnage)
Source: NAB (2023)

Table 3.1 shows rankings by value of the top 15 horticultural products imported, purchased domestically, and exported.
Table 3.1: Top 15 horticulture products per performance area

TOP 15 IMPORTED HORTICULTURE PRODUCTS BY VALUE - 2021/2022

#	PRODUCTS	VALUE (N$)	TONS	SHARE % BY VALUE
1	POTATOES	114,376,358	22,583	44%
2	BANANA	54,369,625	5,474	11%
3	APPLES	31,572,415	8,441	17%
4	ORANGES	31,163,102	4,916	10%
5	GRAPES	15,441,718	850	2%
6	AVOCADOS	14,490,904	756	1%
7	ONIONS	10,887,075	2,471	1%
8	MARITUES	9,060,791	1,520	3%
9	PEARS	8,947,004	1,037	2%
10	GARLIC	7,479,826	135	0%
11	CARROTS	7,404,277	1,207	2%
12	LEMON	7,156,215	820	2%
13	LETTUCE	6,075,910	383	1%
14	GINGER	5,964,429	148	0%
15	STRAWBERRIES	5,765,603	203	0%
	TOTAL TOP 15	**330,155,254**	**50,944**	**70%**
	OTHER	**143,891,857**	**3,783**	**30%**

TOP 15 LOCAL HORTICULTURE PRODUCTS BY VALUE - 2021/2022

#	PRODUCTS	VALUE (N$)	TONS	SHARE % BY VALUE
1	POTATOES	84,452,853	13,336	35%
2	TOMATOES	35,278,845	3,069	8%
3	ONIONS	33,496,741	5,871	16%
4	CARROTS	27,689,575	3,877	10%
5	ENGLISH CUCUMBER	17,538,942	1,299	3%
6	CABBAGE	17,128,329	1,803	5%
7	COLOUR PEPPER	16,323,654	869	2%
8	WATERMELONS	13,487,487	2,117	6%
9	LETTUCE ICEBERG	12,117,629	482	1%
10	MUSHROOM	11,100,302	170	0%
11	BUTTERNUTS	9,653,204	2,061	5%
12	BEETROOT	6,827,721	988	3%
13	GRAPES	6,618,519	338	1%
14	PUMPKINS	5,110,479	974	3%
15	GREEN PEPPER	4,824,730	353	1%
	TOTAL TOP 15	**301,651,009**	**37,607**	**88%**
	OTHER	**41,528,064**	**2,858**	**12%**

TOP 15 EXPORTED HORTICULTURE PRODUCTS BY VALUE - 2021/2022

#	PRODUCTS	VALUE (N$)	TONS	SHARE % BY VALUE
1	GRAPES	830,503,706	37,373	63%
2	TOMATOES	71,234,143	7,611	13%
3	DATES (FRESH)	44,438,760	602	1%
4	ONIONS	35,470,979	7,993	14%
5	DATES (DRIED)	24,905,088	692	1%
6	PEPPER (COLOUR)	21,028,751	1,612	3%
7	BUTTERNUTS	8,745,637	1,358	2%
8	GREEN PEPPER	4,237,087	282	0.5%
9	SWEET MELONS	3,706,780	414	1%
10	BLUEBERRIES	2,506,872	43	0.1%
11	WATERMELONS	2,365,000	348	1%
12	POTATOES	1,237,500	139	0.2%
13	GEM SQUASH	1,156,247	306	1%
14	BRINJAL	498,150	89	0.2%
15	MANGO	352,800	43	0.1%
	TOTAL TOP 15	**1,052,387,500**	**58,903**	**99.9%**
	OTHER	**804,992**	**132**	**0.1%**

Source: NAB (2023)

3.1.2.1 Fruit production

The findings of a study conducted by the NAB in August 2022 found that only 15% of the total land available for fruit production in the country is being utilised and has a population of more than 230 000 trees. There is, therefore, a potential to plant and grow roughly 1.1 million trees on the remaining available land (NAB, August 2022). Most of the unutilised land is found in the Karst (3 573 ha), Zambezi (1 494), and South and Orange River production zones (1 160 ha). In total, there are 6 704 ha of unutilised agronomic and horticulture land available in Namibia (NAB, August 2022).

In the Southern production zone of Namibia, grapes and date production is relatively high and this results in exports of the high-value products out of Namibia (NAB, August 2022). However, production in the remaining parts of the country is poorer and resultantly domestic production of fruits only attains a domestic market share of 4% (NAB, August 2022).

Namibia has a 3% (732 tons) market share in the domestic fruits market versus an import share of 97% (20 282 tons) (NAB, 2019). The fruits discussed below are mainly produced for the export market.

- **Dates and table grapes**
  Table grapes are grown in the Orange River p and South Production zone (95%). Grapes are mainly produced for the export market, and there are 2 217 ha under irrigation. The seedless varieties are White (48%), Red (43%), and Black (9%). Annual production is about 40 000 MT, of which 99% is exported (Abraham, n.d.).

  According to Prinsloo (2021), there are 180ha of newly planted vineyards at Komsberg that will soon be in production. Destination markets for Namibian Table Grapes comprise the European Union (EU) 85%, Africa 6%, Asia 6%, and the Middle East 3% (TradeMap, 2023).

Dates are mainly produced in the Orange River (90%) and South (10%) production zones (Abraham, n.d.). ZZ2 (a South African agricultural company with operations in Namibia) produced 489 tons of Medjool dates in 2021 (Letaba Herald, 2021).

Desert Fruit is also a large producer with 22 000 trees planted on the banks of the Orange River at Skuitdrift. Cultivars are Medjool, Zamli, Khalas and Barhi (desertfruit.com.na). When in full production, Desert Fruit expects to produce over 3 000 tons of export-quality date fruits (New Era Live, 2018).

Namibia's trade in table grapes and fresh or dried dates has boasted a positive trade balance for both products throughout the 2003 to 2022 period. Fresh or dried dates have shown commendable growth in recent years and therefore present an opportunity for export expansion – the growth is shown in Table 3-1.

- **Blueberries**
  Namibia is a new entrant into the blueberry market and very little information is available on the production, consumption, and imports and exports. Mashare Berries in the Kavango East production zone planted 60 hectares under irrigation and harvested 160 tons in 2020 and harvested roughly 400 tons in 2021 (Steinmann, 2021).

  According to NAB (2022c), Namibia produced 480 tons to the value of N$38.4 million during the 2021/2022 season (See Table 3 2).

Table 3.2: Berry production in Namibia during 2021/2022

BERRY TYPE	QUANTITY (TONS)	VALUE IN N$
Blueberries	480	38,400,000
Cranberries	N/A	N/A
Raspberries	N/A	N/A
Strawberries	0.24	8,844
Total	**513.42**	**38,408,844**

Source: NAB (2022)

- **Citrus fruits**
  Namibia commercially produces oranges, lemons, and tangerines (known as nartjies in Namibia and South Africa). According to the NAB (2022), the local production of citrus fruits in Namibia was 448 tons in the 2021/2022 financial year.

  This figure comprised 217 tons of oranges, 132 tons of lemons and limes, 98 tons of tangerines (nartjies), and 0.5 tons of pomelos (see Figure 3.5).

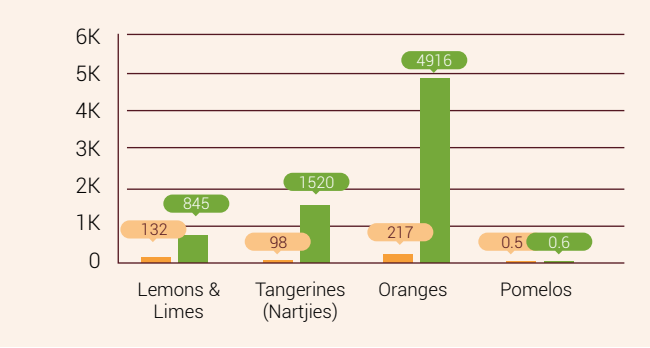


Figure 3.5: Citrus fruits local production vs imports (2021/2022 season)
Source: NAB (2022)

Table 3 3 shows Namibian citrus fruits imports between 2018 and 2022. Namibia imported over 99% of its citrus fruits from South Africa annually, importing an equivalent of N$63 462 000 from South Africa in 2022. In 2018, another major source for imports was Portugal, with Namibia importing N$369 000 worth of citrus fruits. However, Namibia has since imported no citrus fruits from Portugal.

Botswana was a source for N$105 000 worth of citrus fruits imports in 2018 but has since contributed less and less to Namibia's citrus fruits imports annually – contributing N$16 000 towards the import value in 2018. Norway was the third largest source for citrus fruits imports into Namibia in 2022 with an import value contribution of N$16 000.

Table 3.3: Value of citrus fruits imports

EXPORTERS	IMPORTED VALUE IN 2018 (N$)	IMPORTED VALUE IN 2019 (N$)	IMPORTED VALUE IN 2020 (N$)	IMPORTED VALUE IN 2021 (N$)	IMPORTED VALUE IN 2022 (N$)
World	48 228	51 526	60 443	65 780	63 495
South Africa	47 754	51 411	60 411	65 751	63 462
Botswana	105	87	16	15	16
Norway	0	0	0		16
Germany	0	14	16		
Portugal	369	0	0		
Spain	0	14	0		

Source: TradeMap (2023)

According to Hattingh (2022), a one-ha citrus orchard with about 500 trees can offer an annual yield of between N$400 000 and N$1 million, while it costs about N$150 000 to establish it initially.

The NAB (2022) encourages Namibian citrus fruit producers to invest more in citrus fruit production and to take advantage of supplying neighbouring countries such as Eswatini, which are importing large volumes of grapefruits and pomelos. Opportunities to supply citrus fruits to the American market duty-free through the African Growth and Opportunity Act (AGOA) trade agreement is also something that Namibian farmers can take advantage of (NAB, 2022).

3.1.2.2 Vegetables

- **Potatoes**
  Fifty percent of the Namibian potato demand is produced locally. The other half is imported mainly from South Africa. As of the 2018/19 financial year, Namibia's potato demand accounted for 39% of horticultural produce demand, whereas domestic potato farmers harvested around 10 328 MT valued at N$ 8.8 million, and these are traded in the formal market. Potatoes traded at informal markets are estimated to have a ratio of 41% in relation to the tonnage traded via formal markets. Hence, about 7 117 MT are estimated to have been domestically harvested and sold via informal markets (NAB, 2021a).

- **Carrots**
  Statistics from the NAB (2020) report attest that Namibia's local carrot production and yield levels have risen over the past decade. The NAB has made efforts to promote the local consumption of carrots. One of the methods implemented is by regulating the importation of horticultural products during surplus local production periods to avoid market saturation and consequently promoting local trading.

The following figure shows a steadily increasing trend in production from the 2015/16 season to the 2018/19 season. During the same period, there was a decreasing trend in carrot imports (see Figure 3.6).

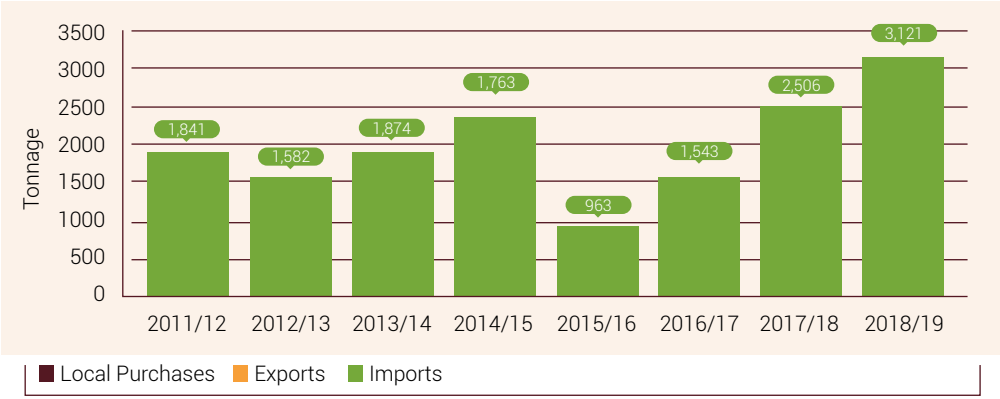


Figure 3.6: Annual carrot production
Source: NAB (2021c)

- **Onions**
  For the past several years, Namibia has had sufficient onion production with a seasonal surplus. There was an upward trend in the production volume, however, the lack of storage facilities and value addition deprive local traders of constantly supplying and meeting the demand all year round.

Annually, Namibia has had an oversupply of local onions during the production season (May to December) and a shortage during the off-season (January to April) (see Figure 3 7) (NAB, 2021b).

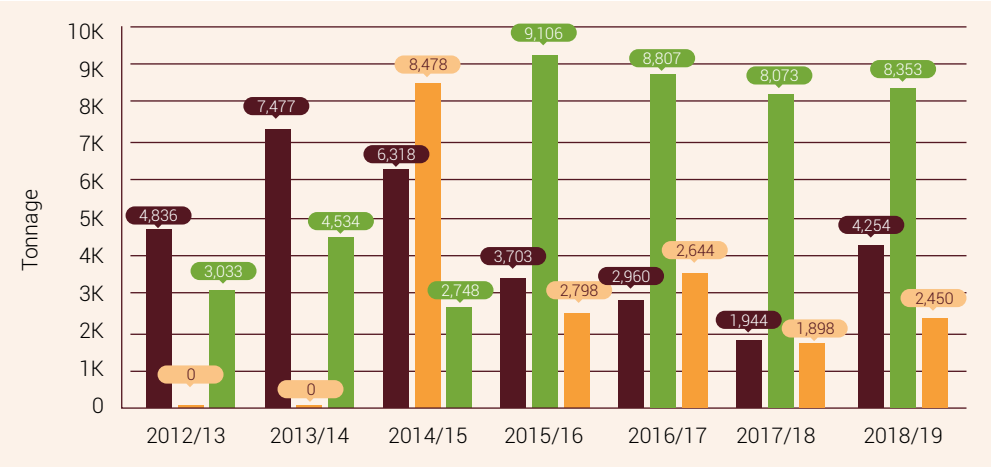


Figure 3.7: Onion local purchases, imports and exports (volumes)
Source: NAB (2021b)

- **Tomatoes**
  Since 2011, Namibia became a net exporter of tomatoes and tomato exports surpassed onion exports in terms of value. Most exports are destined for South Africa, and in 2022, the value of exports was N$137.4 million (TradeMap, 2023). Close to Noordoewer, there is roughly 100 ha dedicated to the production of tomatoes. According to NAB budgets, this equates to roughly 20% of the value of national production (valued at N$27 million).

04

ENVIRONMENTAL SCANNING AND CONSTRAINTS

4.1 SWOT ANALYSIS

Table 4 1 summarises the SW (Strengths and Weaknesses) components of the SWOT analysis. Each of the strengths and weaknesses are categorised according to the value chain levels, except in the case of natural resources.

Regarding Namibia's agricultural landscape, the country faces challenges as an arid region with limited arable land for crop production (agronomic and horticulture). However, stakeholders have identified several strengths that can be leveraged to boost the agricultural sector, specifically the agronomic and horticulture sub-sectors. Several production zones in Namibia hold potential for the productive use of natural resources, thereby offering opportunities to cultivate a diverse range of agronomic crops. Many horticultural products also enter the market at strategic times, filling gaps left by other markets like Europe during their off-season.

The communal areas possess substantial agricultural resources, including water and fertile soil, with untapped potential that exceeds current production levels. To harness this potential, interventions should be implemented to facilitate sustainable private sector investments, leading to improved yields, increased profitability, and job creation.

Table 4 1: Results of the SWOT analysis: SW components

Strengths	Weaknesses
Enhancing natural resource attributes	**Limiting natural attributes**
• Crop diversity • Climate for fruit production that has a unique market window (only for some fruit and vegetables) • Availability of land (i.e., demand/buyers and for expanding local production). An example is the land along the Kavango River, Zambezi River, Kunene River, and Orange River, and land that has sufficient underground water. • Good underground water resources and water reserves in certain areas, for example, the Kavango River, Zambezi River, Kunene River, Orange River, and land that has sufficient underground water. • Highly fertile soils in some areas - mostly in the northern regions, including the Zambezi and Kavango production zones.	• Low organic matter content of soils in most production zones • Climate is generally restrictive to the expansion of grain production • Generally, agro-economic potential is constrained by low soil fertility
Enhancing attributes of value chain players	**Limiting attributes of value chain players**
• Willing and able producers • Existing private-sector investments • Active stakeholder engagement • Well-developed infrastructure in certain areas, e.g., FPB Hubs in Ongwediva and Rundu that can act as a gateway to supply fresh fruits and vegetables to countries in SACU and SADC.	• Small size of the local market limits economies of scale (limited demand) • Stakeholders working in silos - lack of togetherness • Delay in payment of procurers upon delivery of produce to silos • Price variation between the daily price of delivery versus the payment date by millers • Limited communication and collaboration (coordination) between production zones and along the value chain actors and a low apathy for producer cooperation • Irrigation zones are often not optimally managed, resulting in slow and irregular production patterns • Unutilised crop production areas - mismanaged and under-developed • Zero-agro-processing in the fruit/veg sector and limited in the grain sector • Limited skills and capacity of producers • Predominantly small-scale crop production
Enhancing attributes of value chain influencers	**Limiting attributes of value chain influencers**
• Existing trade agreements • Existing quality and food safety standards • Bio-security is easily implementable • Stability in the country/organised/ structured • Government understanding that horticulture is regarded as a driver for growth, thus addressed in NDP 5	• Misalignment of policies, e.g., regulatory constraints that are in place - i.e. non-GMO (Genetically Modified Organism) regulations in Namibia • Policies and regulations not always aligned with the existing realities of the sector (e.g. work permit system, introduction of new plant material) • Lack of monitoring and evaluation of policies at regular intervals

Strengths

- Protection afforded to the industry through policy interventions (e.g., border closure, MSP Scheme, Grain Marketing Scheme)

Weaknesses

- The use of trade barriers to drive local growth and the cost-raising effect of trade barriers/regulatory control that limits a competitive culture – in particular for the processing industry that imports raw materials for local processing.
- Challenges in bureaucratic effectiveness increase the cost of doing business and getting access to resources required in the production processes (e.g. long waiting times for SPS and work permits)
- Access to land with title deeds limits the scale of production, and land as a form of collateral, particularly in Northern communal areas
- VAT on fruit and vegetables pushes prices higher
- Poorly staffed plant health division increases the risk of importing diseases into Namibia

Limiting attributes of value chain supporters

- Shortage of new improved seed varieties and cultivars
- Lack of support /access to mechanical implements and machinery – and poor after-sales service (leading to broken equipment)
- Access to finance
- High costs of inputs, utilities, and logistics (transport, electricity)
- Limited availability of seeds and fertilizers
- Procurement challenges to timely secure production inputs
- Lack of investments (FDI & local)

Strengths

Weaknesses

- Lack of timely Agric R&D, data and technology
- Lack of access to new markets – including domestic markets, especially in distant, remote areas with poor road infrastructure
- Poor storage management and location of storage facilities inducing additional costs
- Limited extension services capacity to train and share information with farmers
- Dependence on South Africa
- Insufficient R&D expenditure/poor technology adoption (including GMOs)
- Lack of financing
- Skills gap
- Export constraints due to infrastructural capacities (logistics, storage, etc.)

Table 4 2 shows the OT (Opportunities and Threats) components of the SWOT analysis. The responses are the views held by individuals at different levels of the value chain.

Table 4 1: Results of the SWOT analysis: SW components

Opportunities	Threats
Potential opportunities stemming from environmental attributes • Climatic production windows for a few crops – especially horticulture crops (International)	**Threatening environmental attributes** • Climate change (climatic anomalies) • Increased aridity • Seasonality of production
Potential opportunities in the crop value chain Sector collaboration towards achieving some objectives highlighted in the SDGs • Stakeholder engagement strengthening • Improved information dissemination along the value chain for improved marketing • Agro-processing and value chain development – value addition (an example is oil production) • Importing for the purposes of value addition • Fodder production (maize, Lucerne, wheat) • Growing crop trade potential in the African market • Diversification of agricultural products to satisfy consumption trends (citrus fruit production for export markets) • Expand domestic production to satisfy domestic demand and to serve the export market – increased yield of staple crops (pearl millet)	**Potential threats in the crop value chain Changes in consumer demand/behaviour** • Economies of scale limitations • Market volatility (including shocks such as COVID-19) • Supply guarantees and input management • Increased input costs (seed, fuel, electricity, labour, water, etc.) • Rising interest rates and inflation • Exchange rate vulnerability • Disease and pest outbreaks • High costs of fodder production
Potential opportunities in the crop value chain Trade deals and trade integration and proximity to the African market (SACU, SADC, Tri-Partite FTA, AfCFTA, EU-EPA) • Strong regional trading blocs (SACU, SADC) • Harambee Prosperity Plan II and NDPs	**Potential threats in the crop value chain** Unstable political/financial environment • Electricity availability • International trade agreements (reduced protectionism and increased competition) • EU Green deal • Corruption • Illegal imports (maize and pearl millet, amongst others) • Government delays in export expansion practices (i.e., identifying markets)

Opportunities	Threats
• Green Schemes, if efficiently managed • Lobbying practices for the creation of an enabling crop production environment	• Dumping of products from other countries negatively influences certain producers • Increased trade barriers by export markets (e.g., SPS, and quantity and quality standards) • Poor biosecurity and SPS standards **Potential threats in the crop value chain supporters** • Loss of appropriately qualified and experienced people • Lack of support for organised agricultural structures • Poor governance and organisational structures • Corruption
Potential opportunities in the crop value chain Trade deals and trade integration and proximity to the African market (SACU, SADC, Tri-Partite FTA, AfCFTA, EU-EPA) • Strong regional trading blocs (SACU, SADC) • Harambee Prosperity Plan II and NDPs • Green Schemes, if efficiently managed • Lobbying practices for the creation of an enabling crop production environment. **Potential Opportunities in the Value Chain Supporters Position** • Green finance creating opportunities for farmers to access funding. Technological advancements.	**Potential threats in the crop value chain** • Unstable political/financial environment. • Electricity availability • International trade agreements (reduced protectionism and increased competition) • EU Green deal • Corruption. • Illegal imports (maize and pearl millet, amongst others) • Government delays in export expansion practices (i.e., identifying markets). • Dumping of products from other countries negatively influences certain producers • Increased trade barriers by export markets (e.g., SPS, and quantity and quality standards) • Poor biosecurity and SPS standards

4.2 CAPACITY CONSTRAINTS

This section considers the perspectives of different stakeholders within Namibia's agricultural value chain, focusing on a broad spectrum of challenges facing the sector. It emphasises overarching concerns, as detailed discussions on specific issues are provided elsewhere in the report. Recognising these challenges and opportunities is crucial as they have a direct and indirect impact on the behaviour, perceptions, and actions of stakeholders. The next section delves deeper into the factors that either boost or hinder competitiveness in the agricultural sector.

Challenges hindering the crop sector in Namibia, include, amongst others, but are not limited to, the high cost of production, pest and disease prevalence, low technology adoption, costly borrowing, and inadequate access to quality seeds, plant materials, and fertilizers. Furthermore, the analysis identified significant communication and coordination challenges among essential government departments, parastatals, and the private sector as areas of weakness. There is a critical need for improved inclusion of various stakeholders within decision-making entities that affect their interests, ensuring that the perspectives and needs of all stakeholders are thoroughly considered and addressed.

Efforts to improve the situation include enhancing the NAB's role in facilitating discussions and decision-making processes, which would benefit from a more inclusive representation of all stakeholders in the agricultural value chain. Strengthening communication channels between the NAB, MAWLR, and other relevant entities is crucial for the timely resolution of sector issues. Furthermore, focusing the NAB's efforts on its core functions while also considering an expansion of its role to better advocate across various value chains could significantly impact the sector's development.

Solutions to address these challenges involve, amongst others, targeted training for NAB and MAWLR staff, the establishment of localised knowledge hubs to transfer skills to smallholder farmers and advocating for better water access and efficient permitting processes. Additionally, improving compliance with local and international standards through incentives and conducting a thorough analysis of the agricultural sector's needs can help overcome production and marketing obstacles. By addressing these interlinked issues comprehensively, Namibia can enhance the competitiveness and sustainability of its agricultural sector, benefiting both local producers and the broader economy.

05

CROP SUBSECTOR STRATEGIC FRAMEWORK

"A goal without a plan is just a wish"
-Antoine de Saint-Exupéry

5.1 INTRODUCTION

The purpose of the following sections is to document the Five-Year Crop Value Chain Strategy and Implementation Plan for Namibia. This report is a follow-up report on the inception report that details the scope and objectives of this report, as well as the industry performance evaluation report. These three reports should be read in conjunction with each other.

This report sets the scene for agricultural production within Namibia. This is done from an environmental (climate, rainfall, soil productivity, etc.) perspective, as well as a policy and business perspective. Several challenges that are faced by value chain players within the country are identified and discussed. Crop production is assessed independently, and the different crops and processed agricultural products (agronomic and horticulture) currently being produced within each production zone are identified.

Additionally, those crops that require specific attention for increased investment and support are also identified. Using this information, specific strategic interventions, actions, and outcomes are provided. Throughout this document, special reference is made to the National Development Plan 5 (NDP 5) and the Harambee Prosperity Plan II (HPP II) to ensure that the strategies are aligned with the two strategic frameworks.

Namibia's NDP 5 and HPP II are strategic frameworks that the Namibian government is currently implementing, and which guide the country's developmental efforts. While these documents encompass various sectors including agriculture, their focus is on addressing socio-economic challenges and promoting sustainable growth.

The NDP 5 is a medium-term development blueprint covering the period from 2017 to 2022 (NPC, 2017). It sets out the government's priorities and strategies to achieve sustainable development across various sectors. The plan is aligned with Namibia's long-term development vision, which aims to transform the country into an industrialised and prosperous nation (RN, 2004; NPC, 2017). The White Paper for the NDP 6 was launched in June 2023, but for purposes of this study, only NDP 5 will be considered as it will be extended to match the timeline of the HPP II.

The HPP II is the second phase of a national development strategy introduced by the Namibian government in 2016 (Namport, 2023). Its overarching goal is accelerating development, reducing poverty, and addressing inequality (RN,2021). The plan emphasises the importance of economic diversification, job creation, infrastructure development, food security, poverty alleviation, and improved service delivery. Latest information indicates that HPP II will continue until 2025, after which NDP6 will take over to be merged to the National Investment Plan.

5.2 VISION AND MISSION

5.3.1 Vision:

The Vision for the Crop Strategy is:
"Growing a sustainable, resilient and competitive crop sector through environmentally friendly efficient allocation and use of resources, a conducive policy environment, pro-active research, fostering of collaboration and increased market access in support of a business and an investment-friendly environment to ensure local food security, increased employment and social development".

5.3.2 Mission:

The mission statement is as follows:
"To enhance the value of the crop sector through dedicated facilitation, cutting-edge research, and development, while ensuring a dynamic regulatory framework that responds to the evolving needs of the industry."

5.3 STRATEGIC GOALS

Themes/goals for the Namibian crop value chain are defined as follows:

1. Climate-smart, inclusive, sustainable, and competitive crop value chain; and
2. A fair and conducive regulatory framework to optimise value chain operations.

5.4 STRATEGIC OBJECTIVES

1. Development of an environmentally sustainable, efficient and cost-effective local input industry to support the competitiveness of the crop sector.
2. To cultivate a conducive production environment, fostering consistent and reliable supplies of farm produce to sustain crop value chains.
3. To develop and support competitive and inclusive local value addition by fostering a conducive investment and business climate.
4. To facilitate and promote efficient and effective marketing arrangements.
5. To facilitate trade promotion and advocacy to grow lucrative international and intra-regional trade.
6. To integrate smallholder farmers into mainstream commercial crop production.
7. To promote a system of technological innovation and transfer to solve problems, open new frontiers and promote inclusivity to attract investments to grow crop value chains.
8. To foster, organise, and enable an environment that supports the development of crop value chains through proactive advocacy efforts.

The following Figure 5.1 shows the crop value chain strategy map, outlining the initiatives and how they relate to value chain positions and the overall vision, mission and objectives of the Crop Value Chain Strategy. The strategic initiatives that were identified during stakeholder consultations for each value chain position are unpacked in Section 6.

Strategic Initiatives (Table)

Input	1. Adopt new chemical labeling standards in line with the GHS. 2. Investigate feasibility for fertilizer blending/mixing plant in Walvis Bay (PPP). 3. Sign the UPOV agreement. 4. Support implementation of Seeds and Seed Varieties Act (Act 23 of 2018). 5. Ensure farmers access quality seeds and fertilizers. 6. Promote local production of improved/certified staple crop seeds. 7. Use technology to improve crop productivity.
Production	1. Promote upscaling of cash crop production. 2. Enhance production of high value crops. 3. Transform Green Schemes via PPPs. 4. Support accurate crop production estimates via automation. 5. Promote water-smart tech and drought tolerant crops. 6. Engage in food safety and quality policy design. 7. Review and harmonize SPS standards. 8. Build customized skills development programs. 9. Offer extension services to farmers and value chain actors. 10. Develop crop insurance plans.
Processing	1. Expand domestic processing capacity. 2. Improve food safety and quality policy design.
Marketing	1. Bridge finance mechanisms for certification. 2. Improve Namibia's storage capacity. 3. Promote locally produced goods. 4. Revitalize FPB Hubs.
Trade	1. Export market development. 2. Import levy rebate policy exploration. 3. Address regulatory constraints, alignment of SPS/trade protocols, and provide support for trade negotiations, promotion, and advocacy.
Smallholder Farmers Development	**Input Initiatives** 1. Mobilize and build local capacity for input access and tech transfer. 2. Develop input standards: site prep, soil, seed, pest management, etc. **Production Initiatives** 1. Setup support centers. 2. Improve site-specific production practices. 3. Use ICT for knowledge transfer. 4. Develop finance mechanisms. **Processing & Value Addition Initiatives** 1. Link smallholder farmers to processors. 2. Develop agro/horticultural value addition. **Storage Initiatives** 1. Establish centralized storage facilities. **Marketing Initiatives** 1. Improve market access and remove barriers. **Export Initiatives** 1. Link farmers with export value chains.
Research and Development	1. Collaborate with DARD and NCRST on research. 2. Improve research-based decision-making. 3. Use research to improve production, processing, storage, and marketing.

Figure 5 1: CVCDS Strategy map

06

STRATEGIC INTERVENTIONS FOR NAMIBIA'S CROP SUBSECTOR

6.1 INTRODUCTION

In this Section, the different issues raised by stakeholders as well as strategic interventions to advance Namibia's crop subsector are presented. Each strategic intervention is linked to a theme/ goal and the specific strategic objective.

6.1.1 Input Value Chain Intervention

Table 6 1 displays strategic interventions related to the input position within the value chain.
Table 6 1: Strategic interventions related to the input position within the value chain

Strategic theme/goal	1. Climate-smart, inclusive, sustainable, and competitive crop value chain 2. A fair and conducive regulatory framework for optimising value chain operations
Strategic objective	1. Development of an environmentally sustainable, efficient and cost-effective local input industry to support the competitiveness of the crop sector.
Strategic Interventions	1. Adopt new chemical labelling standards worldwide in accordance with the Globalized Harmonised System (GHS) and sensitise domestic users to the new chemical standards. 2. Facilitate an investigation into the financial feasibility of the construction of a fertilizer blending and mixing plant at Walvis Bay through a Public Private Partnership (PPP). 3. Facilitate the signing of the International Union for the Protection of New Varieties of Plants (UPOV) agreement. 4. Support the implementation of the Seeds and Seed Varieties Act (Act 23 of 2018) 5. Ensuring that farmers, both small-scale and commercial, have seamless access to essential inputs such as good quality seeds and fertilisers. 6. Promote the local production of improved and certified seeds for staple crops (e.g. pearl millet). 7. Promote the use of technology to improve crop productivity.

01. Adopt new chemical labelling standards worldwide in accordance with the Globalized Harmonised System (GHS) and sensitise domestic users to the new chemical standards

New chemical labelling standards are being adopted worldwide in accordance with the Globalized Harmonised System (GHS) of the classification and labelling of chemicals. However, Namibia has been slow to adopt these standards and is yet to do so. This makes imports of chemicals (such as pesticides and herbicides) difficult and expensive as domestic input suppliers are required to repackage the chemicals.

02. Facilitate an investigation into the financial feasibility of the construction of a fertilizer blending and mixing plant at Walvis Bay through a Public Private Partnership (PPP)

Namibian input suppliers and farmers currently import fertilizers and other chemical inputs via South Africa. The transport costs add significantly to the total costs of inputs, thereby impacting negatively the competitiveness of producers. Hence there is a need for Namibia to conduct a feasibility study for setting up a fertiliser blending plant in Walvis Bay. It is hence urgent to facilitate an investigation into the financial feasibility of the construction of a fertilizer blending and mixing plant at Walvis Bay through a Public Private Partnership (PPP).

03. Facilitate the signing of the International Union for the Protection of New Varieties of Plants (UPOV) agreement

Namibia's non-membership in UPOV hampers competitiveness, restricts access to new seed varieties and hinders the adoption of locally suitable options. It prevents producers from diversifying and improving their farming practices as Namibia's access to new, up-to-date and climate-ready seed and plant varieties currently being planted elsewhere in the world is limited. Becoming a member of UPOV will enable access to new, more efficient, suitable, and in-demand seed varieties. This will improve the competitiveness of Namibian farmers and hence improve their ability to compete in international markets. Depending on available cultivars it may also make farmers less susceptible to climatic risks like drought.

04. Support the implementation of the Seeds and Seed Varieties Act (Act 23 of 2018)

The Seed Policy of 2013 specifically addresses issues related to:

- the seed certification service,
- the creation of a National Seed Council,
- the establishment of an official Crop Variety Release Committee,
- seed testing and processing,
- the seed inspectorate,
- the Seed and Seed Varieties Bill, and
- the Plant Breeders and Farmers Rights Bill (MAWF, 2013).

According to the MAWF (2013), the implementation and utilisation of the Seed Policy will aid in promoting a strong, vibrant, and healthy national seed industry while providing an environment that is conducive to growth in Namibia's seed industry. Specific objectives relating to the Seed Policy speak to research and extension, germplasm conservation and utilisation, capacity building, seed importation (linked to UPOV), seed production, processing and quality control in the formal sector, seed production, processing and quality control in the informal sector, forest seed, and seed quality control (MAWF, 2013).

In 2018, the Seed and Seed Varieties Act 23 was promulgated. The Act provides for (i) the appointment of the Registrar of seed and seed varieties and the registration of producers, processors and dealers of seed and control over imports and exports of seed, (ii) the establishment of the Namibia Seed Council and the Seed Varieties Committee and their powers and functions, (iii) the establishment of a national seed varieties register, (iv) the establishment of the Seed Certification Service and its powers and functions, and (v) incidental matters. The promulgation of this Act addresses most issues in the Seed Policy of 2013, except the Plant Breeders and Farmers Rights Bill.

05. Ensuring that farmers, both small-scale and commercial, have seamless access to essential inputs such as good quality seed and fertilisers

Improved and quality seeds are the cornerstone of agricultural productivity. They are engineered to be more resilient and capable of withstanding adverse climate conditions, pests, and diseases. By providing access to such seeds, the aim is to significantly enhance crop yields, ensure food security, and improve the livelihoods of farming communities. The provision of high-quality planting materials promises to diversify agricultural outputs, thereby enabling farmers to meet the ever-evolving demands of the market and ensuring nutritional security.

Fertilizers, on the other hand, play a pivotal role in optimizing plant growth and soil health. The strategy would, amongst others, include the promotion of both organic and inorganic fertilizers that cater to the specific needs of different crops and soil types. By facilitating access to these fertilizers, the intention is to empower farmers to achieve optimal agricultural productivity, while also encouraging practices that maintain or improve soil fertility over time, thus ensuring the sustainability of farming operations.

The approach encompasses several key actions: building robust supply chains that reduce the cost and improve the distribution of seeds and fertilizers, fostering partnerships with research institutions for the development and dissemination of improved seed varieties, and advocating for policies that support the use of sustainable fertilizers. Enhancing farmers' knowledge and skills through targeted training and extension services, as well as enabling them to make informed decisions about the selection and use of seeds and fertilizers will be vitally important.

In essence, by prioritizing access to improved and quality seeds/planting materials and fertilizers, the goal is not only looking to elevate the agricultural sector's productivity but also to instil resilience against the challenges posed by climate change and market fluctuations. This strategic direction is poised to catalyse a transformation that aligns with other overarching goals of ensuring food security, fostering economic growth, and promoting environmental sustainability.

06. Promote local production of improved and certified seeds for staple crops (e.g. pearl millet)

Promoting the local production of improved and certified seeds for staple crops like pearl millet is crucial for enhancing agricultural productivity and food security. Improved seeds are bred to possess desirable traits such as higher yields, disease resistance, and drought tolerance. By focusing on local production, farmers can access seeds that are specifically adapted to the regional climatic and soil conditions, thereby increasing the likelihood of successful harvests. Moreover, the certification process ensures that the seeds meet quality standards, thereby giving farmers confidence in their reliability and performance. This local seed production not only boosts crop yields but also supports sustainable farming practices and resilience against climate change.

07. Promote the use of technology to improve crop productivity

Namibia, characterised by its arid and semi-arid landscapes, faces unique agricultural challenges, particularly in enhancing crop production. Amidst these challenges, the imperative to employ technological advancements to transform crop production, boost crop productivity, and secure food sovereignty remains paramount. The strategic imperative in Namibia involves leading the integration of innovative technologies into the agricultural sector, aiming for a model of efficiency and sustainability.

The promotion of precision agriculture is foundational to this imperative. Advanced technologies such as satellite imagery, drones, and IoT-based sensors will enable Namibian farmers to achieve precision in water management, fertilisation, and pest control. These technologies are vital for optimizing resource utilisation, thus significantly reducing waste and improving crop yields, even under challenging environmental conditions.

The deployment of smart irrigation systems is another critical element of the strategy. In the context of water scarcity in Namibia, efficiently using water resources is crucial. Smart irrigation technologies, which tailor water application based on real-time soil moisture data and weather predictions, ensure that crops receive precisely what they need and when they need it, thereby conserving vital water resources and enhancing crop resilience against drought stress.

The widespread adoption of mobile agricultural applications among Namibian farmers is also recognised as essential. These apps provide critical information on crop management practices, market prices, weather forecasts, and pest and disease alerts, thereby enabling farmers to make informed decisions, and improving productivity and economic returns.

Exploring high-tech greenhouses farming techniques offers a promising avenue for expanding high value vegetable crops in Namibia. These controlled environment crop production systems can produce high yields of vegetables using minimal water and land, thus opening new pathways for food production.

Achieving this imperative involves nurturing partnerships between government entities, private sector firms, and international organisations to invest in the infrastructure and training programmes necessary for agricultural technology. Establishing a strong ecosystem that fosters innovation and facilitates the transfer of technology is intended to provide Namibian farmers with the necessary tools and knowledge to thrive in the contemporary agricultural landscape.

6.1.2 Production Value Chain Intervention

Table 6 2 displays strategic interventions related to the production position within the value chain.
Table 6 2: Strategic interventions related to the production position within the value chain

Strategic theme/goal	1. Climate-smart, inclusive, sustainable, and competitive crop value chain 2. A fair and conducive regulatory framework for optimising value chain operations
Strategic objective	1. To cultivate a conducive production environment, as well as foster consistent and reliable supplies of farm produce to sustain crop value chains
Strategic Interventions	1. Promote upscaling of cash crop production 2. Facilitate the production potential of alternative high-value crops 3. Transformation of all the Green Schemes through Public-Private Partnerships (PPP) 4. Conduct more accurate and timely crop production estimates 5. Build resilience to climate change by promoting irrigated crop production and cultivation of drought-tolerant crops 6. Amend and where necessary engage in the design of policies to ensure and enhance food safety and quality 7. Review, harmonisation and collaboration - SPS standards 8. Design and implement customised skills development and capacity-building programmes 9. Delivery of relevant and timely information and services to farmers and other value chain role players 10. Develop and implement a crop insurance plan for producers

01. Promote upscaling of cash crop production and increasing crop productivity

The strategic imperative focuses on bolstering and facilitating, particularly for small-scale farmers, the expansion of cash crop production, with an emphasis on maize, while ensuring the sustained cultivation of traditional crops in the near to intermediate future. This endeavour aims at augmenting agricultural output by leveraging cooperative use of essential infrastructure such as silos and mills. This initiative targets, among other challenges, the issue of surplus vegetable production and aims to curtail wastage significantly.

Concurrently, there is a pressing need to enhance the accessibility and adoption of contemporary post-harvest storage technologies, alongside the formulation of strategies that contribute to the added value of agricultural products. A critical component of this approach involves conducting a thorough mapping of crop production throughout Namibia, thereby establishing precise and efficient data collection systems. These systems are anticipated to be instrumental in facilitating informed decision-making processes at both the farm and supply chain levels. Additionally, they are expected to provide trade negotiators with valuable insights, thereby enabling them to identify alternative markets for surplus agricultural produce. Through these comprehensive interventions, the goal is to elevate crop productivity and ensure sustainable development and economic growth within Namibia's agricultural sector.

A notable example of private sector involvement/interest is evident in the Mahangu Proposal presented by the Mahangu Millers Association. Pearl millet production is actively encouraged in Namibia, particularly in the northern regions, as it is a traditional staple crop. However, the production of pearl millet faces limitations such as poor yields and insufficient returns for growers. Despite being a staple, pearl millet currently represents only about 1% of millers' total business, indicating substantial untapped potential for the expansion of both production and processing. To transform the pearl millet production and processing landscape in Namibia, a demand-led approach is proposed. This approach could bring about significant changes by incentivising millers to engage commercially with both small-scale and commercial pearl millet producers.

Some interventions in this direction are already underway, with the Mahangu Millers' Association being invited to join the broader millers' association. The expansion of pearl millet production may involve larger commercial producers engaging in contract growing of pearl millet. These established producers can then serve as mentors to smallholder farmers receiving pearl millet subsidies, thus fostering increased productivity through improved production practices, the adoption of advanced technology, and the creation of economies of scale in the pearl millet supply chain. This collaborative effort holds the potential to uplift pearl millet production in Namibia and enhance the economic viability of smallholder farmers.

02. Facilitate the production potential of alternative high-value crops through automation

The cultivation of high-value crops such as blueberries, citrus, table grapes, and nuts, presents robust export opportunities. The intensive and lucrative nature of these crops allows for leveraging export potential while concurrently generating increased employment. Exporting these crops contributes to earning valuable foreign exchange. Notably, certain crops like blueberries do not necessitate extensive land, thereby enhancing accessibility to high-value markets for

small-scale farmers. Therefore, it is imperative to promote and facilitate the expansion of high-value crop production through measures such as safeguarding plant breeders' rights, investing in research and development, ensuring access to finance, providing extension support, implementing certification processes, initiating market access programmes, and establishing world-class logistical infrastructure.

03. Transformation of all the Green Schemes through Public-Private Partnerships (PPP)

It is crucial to transform Green Schemes into commercially oriented operations that are seamlessly integrated into value chains encompassing both inputs and outputs. This shift is imperative to unlock the full potential of available resources. By undergoing this transformation, Green Scheme beneficiaries gain the ability to directly collaborate with input suppliers and other entities involved in the production and marketing processes.

Facilitating prompt access to production inputs tailored for market-driven production will not only optimize resources but also encourage efficient infrastructure utilisation, community engagement, and capacity building. Additionally, the establishment of satellite production units linked to Green Schemes enhances inclusivity, providing smallholder farmers with opportunities to leverage economies of scale, receive support from Green Scheme operators, and participate in high-value markets.

Ensuring transparency and accountability in the tender processes for Green Schemes, along with regular reporting on the progress made is a crucial step towards enhancing public trust and ensuring the involvement of the most efficient value chain participants.

Clearly and contractually outlining the roles and responsibilities of smallholder and commercial components within Green Schemes is equally important. This practice assures commercial investors that operational responsibilities are shared fairly and equitably, thereby incentivizing greater participation from the commercial sector.

This collaborative approach is poised to increase productivity and empower small-scale crop production, ultimately leading to stimulated localised economic growth.

04. Conduct more accurate, timely, and transparent crop production estimates

Accurate market information will positively influence the competitiveness of value chain stakeholders at different levels. It will also prevent the millers from only purchasing small quantities at a time to avoid being stuck with more expensive grain – in comparison to the cheaper South African grain. This will improve efficiency in the sector.

05. Build resilience to climate change by promoting irrigated crop production and cultivation of drought-tolerant crops

Addressing the growing challenges posed by climate change necessitates an imperative within the agricultural sector aimed at enhancing resilience through the adoption of innovative and sustainable practices. This entails, amongst others, the following: the adoption of water-smart technologies and the encouragement of planting drought-tolerant crops. These measures are essential for adapting to erratic weather patterns, hence ensuring steady food production and protecting the livelihoods of farming communities and food security.

Water-smart technologies, including precision irrigation systems and water-efficient drip irrigation, are at the forefront of this initiative. These technologies aim to maximize water efficiency by reducing water wastage and enhancing efficiency. The cultivation of drought-tolerant crops represents another fundamental aspect of building climate resilience and provides a viable option for sustaining agricultural productivity in drought-prone environments. Investing in research and development programmes is crucial for generating such crops, thereby offering farmers a variety of choices that meet their specific climatic and soil needs. Signing the UPOV agreement plays a significant role in enabling broader access to drought-tolerant crops and varieties. Moreover, membership in the UPOV opens doors to a global pool of agricultural innovations, thus providing essential crop varieties that are critical for climate adaptation.
In addition to these strategies, further climate change mitigation efforts involve soil conservation techniques like no-till farming, which helps prevent soil erosion and improve water retention.

In essence, fortifying climate change resilience within the agricultural sector requires a comprehensive approach that includes the integration of water-smart technologies, the introduction of drought-adapted crops, and soil preservation. The role of international collaboration, highlighted by the UPOV agreement, is paramount in ensuring access to the advancements and varieties necessary for farmers to navigate the impacts of a changing climate effectively.

06. Amend and where necessary engage in the design of policies to ensure and enhance food safety and quality

Ensuring food safety and quality is a critical strategic imperative that necessitates concerted efforts in policy development and support. This focus aims to safeguard public health by establishing stringent standards for food production, processing, and distribution, thereby guaranteeing that food consumed by the public is safe, nutritious, and of high quality. Developing robust policies in this area involves a comprehensive approach that includes rigorous testing, certification processes, and continuous monitoring to detect and mitigate potential risks to food safety.

Collaboration among government agencies, food producers, and other stakeholders is essential to create an integrated framework that addresses the entire food supply chain. This includes the implementation of best practices in crop production and manufacturing, thereby enhancing traceability systems to quickly respond to food safety incidents and educating consumers on food handling and hygiene. Moreover, policies must be adaptable to emerging challenges such as those posed by new pathogens, climate change, and the globalization of the food supply, thus ensuring resilience and responsiveness in food safety protocols.

Investment in research and innovation also plays a vital role in advancing food safety and quality. By exploring new technologies and methodologies such as blockchain for traceability or advanced packaging materials, stakeholders can further reduce risks of contamination and extend the shelf life of food products.

In essence, supporting and developing policies for food safety and quality is not just about compliance with standards; it's about fostering a culture of excellence and accountability across the food system. This strategic imperative is foundational to building consumer trust, promoting public health, and ensuring the long-term sustainability of the food industry.

07. Review, harmonisation and collaboration - SPS standards

In the dynamic agricultural landscape of Namibia, ensuring a level playing field for all participants in the value chain is essential for boosting competitiveness. A critical step towards achieving this equilibrium involves the review and harmonisation of SPS standards tailored to the unique production and marketing environment of Namibia. This process is not only about aligning with international benchmarks but also about fostering an environment where fairness and equality in market access prevail.

The NAB plays a pivotal role in this endeavour, especially through strategic collaboration with the Plant Health Department of the MAWLR. Together, these entities can embark on a comprehensive review of existing SPS standards, thereby ensuring that they meet both local and international needs while safeguarding public health and ensuring the integrity of agricultural trade.

Specifically, the NAB can lend its support by assisting in the monitoring of SPS issues, thus acting as a bridge between farmers, producers, and the regulatory framework established by the MAWLR. This collaboration can facilitate the timely identification and resolution of potential SPS concerns, preventing trade disruptions and promoting the smooth flow of Namibian agricultural products to regional and overseas markets.

Harmonizing SPS standards under this collaborative framework not only ensures equal access to lucrative markets but also enhances Namibia's reputation as a reliable supplier of safe and quality agricultural products. This strategic alliance between the NAB and the MAWLR's Plant Health Department is fundamental in navigating the complexities of global trade, thus ensuring that Namibian crop production remains competitive and sustainable in the international arena.

08. Design and implement customised skills development and capacity-building programmes

In Namibia, the path to revitalising the agricultural sector, particularly for small-scale farmers, hinges on comprehensive skills development and capacity-building interventions focusing on both crop production and marketing. The crucial role of extension services in this paradigm cannot be overstated, as they act as conduits of knowledge and innovation from agricultural

research to practical farming applications. To amplify their effectiveness, extension services themselves must undergo targeted skills development and capacity-building programmes, thereby ensuring that they possess the necessary competencies to guide and support farmers towards sustainable agricultural practices and market success.

To enrich these developmental endeavours, forming partnerships with the private sector emerges as a strategic move to facilitate skill transfer and innovation dissemination. The engagement with existing commercial farmers through mentoring programmes presents an invaluable opportunity for knowledge exchange, wherein practical insights and successful strategies can be shared with small-scale and emerging farmers, thus fostering a collaborative growth environment.

Furthermore, tapping into the support of international development agencies for funding can significantly bolster the scope and impact of skills development interventions. By leveraging financial resources and expertise from these agencies, Namibia can implement comprehensive training programmes tailored to the nuanced needs of its agricultural sector.

Additionally, capitalizing on existing skills development programmes available both internationally and within the region can provide a wealth of resources and best practices that can be adapted to the Namibian context. This approach not only enhances the efficiency of developmental efforts but also promotes regional collaboration and learning.

A skills audit of both farmers and extension officers stands as a foundational step in this comprehensive strategy. By accurately assessing the current skill levels, gaps can be identified, and programmes can be designed to address these deficiencies effectively, thus ensuring that every initiative is directly aligned with the needs of its beneficiaries.

Incorporating these strategic elements into Namibia's approach to skills development and capacity building in the crop sub-sector ensures a multifaceted and robust framework. By fostering partnerships, encouraging mentoring, securing funding, leveraging existing programmes, and conducting thorough skills audits, Namibia sets the stage for a transformative agricultural sector that is not only competitive on a global scale but also a cornerstone of national economic development and food security.

09. Delivery of relevant and timely information and services to farmers and other value chain role players

The enhancement of information and advisory services to industry players stands as a critical necessity in modern crop production, playing a pivotal role in the success and sustainability of farming operations. The cornerstone of this endeavour is the provision of timely and accurate information on market conditions - including price movements, supply conditions, and weather events - both locally, regionally, and globally. In a rapidly changing agricultural landscape, the ability of farmers to make informed decisions hinges on their access to relevant and current data.

Leveraging technology is key in delivering this vital information efficiently. By adopting advanced digital platforms and mobile applications, information can be disseminated quickly, thus ensuring that farmers receive updates in real-time. This instant access enables them to adjust their strategies promptly in response to market fluctuations or adverse weather conditions, hence safeguarding their crops and optimizing their market positions.

Behind the scenes, robust systems for data collection and analysis are indispensable. These systems gather comprehensive data from a variety of sources and transforming it into actionable insights tailored to the specific needs of farmers. This process involves not just the aggregation of data but also its careful analysis to ensure that the information provided is both relevant and useful, enabling farmers to maximize their productivity and profitability.

Ultimately, the goal of enhancing information and advisory services is to address the needs of farmers with precision and timeliness. By ensuring that farmers have access to the information they need when they need it, these services empower them to navigate the complexities of modern crop production successfully. This strategic focus on information delivery and service provision is fundamental to supporting the agricultural industry, driving economic growth, and ensuring food security in an ever-evolving global marketplace.

10. Develop and implement a crop insurance plan for producers

Crop insurance helps farmers mitigate financial losses caused by natural disasters, adverse weather conditions, or other unforeseen events that can damage crops. It provides a safety net which ensures that producers can recover financially and continue operations even after a crop failure.

6.1.3 Processing Value Chain Intervention

Table 6.3 displays strategic interventions related to the processing position in the value chain.

Table 6.3: General strategic interventions related to the processing position in the value chain

Strategic theme/goal	1. Climate-smart, inclusive, sustainable, and competitive crop value chain 2. A fair and conducive regulatory framework for optimising value chain operations
Strategic objective	1. Develop and support competitive and inclusive local value addition by fostering a conducive investment and business climate
Strategic Interventions	1. Facilitate opportunities to expand domestic processing/value addition capacity through the establishment of the agro-processing scheme/ programme 2. Develop standards to ensure and enhance food safety and quality of processed products

01. Facilitate opportunities to expand domestic processing/value addition capacity through the establishment of the agro-processing scheme/ programme

There are numerous opportunities for enhancing local value through strategically positioned processing capacity. Value addition involves strategically refining raw agricultural products to create goods with heightened market value, utility, and consumer appeal. This includes, among others, the utilisation of specialised processing facilities to convert raw crops into refined, processed, or packaged goods tailored to specific consumer demands. This process fosters economic growth in the agricultural sector by creating avenues for market expansion, diversification of products, and increased profitability for farmers and stakeholders.

In Namibia, potential quick wins for value addition encompass manufacturing animal feed from locally produced grains, producing sunflower oil and oil cake, making tomato paste, expanding the processing capacity for maize and wheat into products for human consumption (both locally and for exports), and establishing packhouses for high-value crops. Long-term successes in value addition will hinge on the expanded production of raw materials for both low and high-value crops. In some instances, this may necessitate imports to fully utilise processing capacity. Examples include the production, sorting, and packing of high-value crops in production zones suitable for their cultivation such as the expansion of citrus, nuts, and blueberries.

The expansion of local processing capacity is a multifaceted endeavour requiring a coordinated process to systematically address specific characteristics within the targeted value chain:

- the strategic importance of the value chain
- the current and future competitive advantage of the value chain
- local and international market potential
- technology and technological innovation required
- infrastructure and support services required
- trade protection measures
- government support and policy framework to assist start-ups
- market monitoring and evaluation
- roadmap to gradual liberalisation
- public-private collaboration
- environmental sustainability

02. Amend and where necessary engage in the design of policies to ensure and enhance food safety and quality

This imperative is connected to the food safety and quality imperative outlined in point six within

6.1.4 Marketing Value Chain Intervention

Table 6.4 displays strategic interventions related to the marketing position within the value chain.

Table 6.4: General strategic interventions related to the marketing position within the value chain

Strategic theme/goal	1. Climate-smart, inclusive, sustainable, and competitive crop value chain 2. A fair and conducive regulatory framework for optimising value chain operations
Strategic objective	1. To facilitate and promote efficient and effective marketing arrangements
Strategic Interventions	1. Facilitate bridging finance mechanisms through silo certification 2. Address storage capacity constraints in Namibia 3. Promote and facilitate the marketing of locally produced products 4. Facilitate the revitalisation process of the FPB Hubs to function optimally

01. Facilitate bridging finance mechanisms through silo certification

Current marketing arrangements pertaining to grains entail that producers are only paid for their produce once it is milled by millers. This could mean significant delays from the time that grain is delivered to silos until payment is received, and hence constraining the producers' cash flow. To remedy this situation, for example, a similar system used in South Africa should be investigated where silo certificates act as the necessary collateral for financial institutions to finance primary producers before receiving payment for grains marketed.

The silo certificates should then also act as a tender for input suppliers. Consideration must be given to an independent governing body that has the authority to issue silo certificates and that is trusted by all value chain players, including financiers, to ensure that the silo certificate system is credible and operates effectively.

02. Address storage capacity constraints in Namibia

The allocation of various storage facilities in Namibia remains problematic, increasing overall transaction costs to store and transport surplus crop produce. However, for example, the erection of new traditional storage facilities given the seasonal nature of grain production will not be a feasible solution. Examples were mentioned during the consultative process that some producers are delivering white maize to silo storage facilities provided by millers in Windhoek, all the way from the Kavango production zone . Some of the silo storage facilities that are run by the AMTA are also dysfunctional and poorly managed. For example, there is a silo storage facility at Katima Mulilo that is not operational. The private sector investigated the costs that it would need to get the said silo storage facility operational again – the costs summed to approximately N$12 million.

Instead of erecting large and expensive silo storage facilities in the northern parts of the country where maize is grown in excess, silo bags present an attractive cost-effective alternative. This would allow for storage facilities to be closer to the producers in the north (and other parts of the country). The commercialisation of white maize in the northern region of Namibia and the installation of appropriate silo bag storage facilities is an important opportunity to be capitalised on. Cognisance should, however, be taken that areas that practise double cropping could justify investment in permanent grain storage facilities since it could significantly reduce the total unit cost of storage on an annual basis since economies of scale will be more attainable.

[2]It has been noted that there are silo storage facilities in the northern parts of the country, but poor management or the complete lack thereof, as well as bad placement of said silos has led to under-utilisation and dilapidation.

This will provide access to more affordable storage facilities for farmers, driving storage costs down, and in turn, making the final product more affordable for the end consumer. Less grain will be wasted, and the safe storage of grain will also ensure that the product is safe for consumption.

03. Promote and facilitate the marketing of locally produced products

Promoting and facilitating the marketing of locally produced agricultural products is a pivotal strategy for boosting the agricultural sector's competitiveness and sustainability. This multifaceted approach hinges on providing market incentives to local producers, thereby enhancing their profitability and enabling reinvestment into their farms. By aligning with shifts in local consumers' tastes and preferences, producers can tailor their offerings to meet demand, thus elevating the marketability and value of their products.

Efficient marketing channels play a crucial role by minimizing waste and reducing transaction costs, which, in turn, ensures that produce reaches the market in optimal condition, thereby securing better prices for farmers. This strategy necessitates a collaborative effort to improve logistical and distribution networks and to streamline policies to lower the cost of doing business for agricultural producers.

Moreover, addressing infrastructure constraints such as improving roads, storage facilities, and digital connectivity, requires collaboration with various government departments. These improvements are essential for smoothing operations, reducing losses, and enhancing the supply chain's overall efficiency. Consequently, local consumers gain access to the best-priced and highest-quality food, which supports food security and encourages the consumption of locally produced products.

In summary, this comprehensive approach not only ensures the highest possible prices for farmers' produce but also significantly contributes to the broader economy and the well-being of local consumers. By remaining responsive to consumer preferences, streamlining marketing channels, reducing operational costs, and enhancing infrastructure, the agricultural sector can achieve greater profitability, sustainability, and a strengthened position in both local and global markets.

4. Facilitate the revitalisation process of the FPB Hubs to function optimally

Crucial to Namibia's commitment to bolster both national and household food security is the expansion of crop production, aligning with the strategic goal, "To cultivate a conducive production environment, fostering consistent and reliable supplies of farm produce to sustain crop value chains." The execution of the Market Share Promotion Scheme (MSPS) has proven instrumental in enhancing the local procurement of agricultural products. Furthering local production growth aligns with the objectives of the MSPS, thereby providing continued support for sustained progress.

Achieving an increase in local production beyond current levels necessitates the effective operation of market institutions and infrastructure. This is essential to ensure that high-quality produce, compliant with local food safety and regulatory standards, reaches consumers at prices supporting local producer investment while remaining affordable. Simply expanding production without a concurrent boost in demand may lead to a decline in real product prices, thereby discouraging investments in production and elevating the reliance on imports. Therefore, it is crucial for demand to keep pace with increased production, sustaining prices favourable for heightened investment in local production. Furthermore, these institutions and infrastructure should play a pivotal role in seizing opportunities presented by overseas markets, thus fostering the expansion of demand for Namibian agricultural produce.

From an institutional and infrastructure perspective, the Fresh Produce Business (FPB) Hubs located in Ongwediva and Rundu are particularly noteworthy. Each of these FPB Hubs has received investments exceeding N$100 million, signifying substantial commitment. Positioned strategically, these hubs have the potential to play a vital role in the growth of the crop sector, particularly in Northern Namibia. Unfortunately, the FPB Hubs are not currently operating at their envisioned

and potential, with various reasons contributing to this situation, though not delved into here.

The important point is that the revitalisation of the FPB Hubs brings about a myriad of benefits for the agricultural ecosystem. These hubs can act as pivotal support centres, fostering the growth of production by providing a centralised platform for producers to connect with buyers. The hubs also facilitate transparent market transactions and fair price determination, thus ensuring an equitable marketplace for all stakeholders. Serving as efficient collection and delivery points can streamline logistics and reduce overall transaction costs for both producers and buyers. Moreover, the FPB Hubs can contribute to the diversification of available produce, thus offering consumers a broader spectrum of fresh and locally sourced options. In essence, the FPB Hubs can and should play a crucial role in enhancing the efficiency, transparency, and vibrancy of the agricultural supply chain, benefiting all participants from farm to table.

Furthermore, both FPB Hubs harbour the potential to evolve into the primary gateway for agricultural produce, especially considering their strategic location. This positioning positions them to play a pivotal role in advancing the objectives outlined in the African Continental Free Trade Agreement (AfCFTA). By leveraging the Southern African Customs Union (SACU) production capacity and knowledge, these hubs can not only strengthen regional agricultural trade but also contribute significantly to Namibia's foreign exchange earnings. Additionally, they can serve as catalysts for an expanded demand base, thus fostering economic growth and sustainability within the agricultural sector.

It is of critical importance that the improvements and maintenance of the infrastructure of the FPB Hubs are aligned with the activities of other government agencies, otherwise the investments can be considered as fruitless and wasteful expenditure. This in turn requires meaningful collaboration between the NAB and other government agencies.

6.1.5 Trade Value Chain Intervention

Table 6-5 displays strategic interventions related to the trade position.

Table 6 5: General strategic interventions related to the trade position

Strategic theme/goal	1. Climate-smart, inclusive, sustainable, and competitive crop value chain 2. A fair and conducive regulatory framework for optimising value chain operations
Strategic objective	1. Facilitate trade promotion and advocacy to grow lucrative international and intra-regional trade
Strategic Interventions	1. Export market development programme/ scheme 2. Investigate the possibility of introducing an import levy rebate on exports of processed controlled products manufactured from imported raw materials. 3. Expand capacity to address regulatory constraints, alignment of the SPS and other trade protocols and provide support during trade negotiations, trade promotion, and advocacy.

01. Export market development

Namibia's relatively small domestic market limits demand. The responsibility of marketing crops/ products for export is primarily the responsibility of the private sector. In addition, increased development towards cross-border value chains within SACU, and increased industry co-operation is a promising venture for Namibia's crop sector. The AfCFTA is an opportunity in this regard.

Leveraging trade opportunities will require collaboration on, amongst others, issues such as harmonisation of the SPS standards and identifying market access opportunities and requirements to enter new markets for specific export-ready crops. There is also a limited allocation of resources towards government involvement in overseas trade promotion, and trade fairs aimed at opening new export market opportunities and strengthening ties in existing markets.

One of the potential hurdles to increasing exports and collaboration across borders is that it would likely require Namibia to open its borders to stimulate intra-industry trade. This could potentially leave domestic producers exposed to international competition from neighbouring and other overseas countries. On the other hand, it could potentially increase opportunities for Namibian producers to collaboratively access market opportunities across the African continent.

02. Investigate the possibility of introducing an import levy rebate on exports of processed controlled products manufactured from imported raw materials

Import levies increase the costs of internationally sourced agricultural products. This in turn can negatively influence the competitiveness of domestic processors that import crops for the purposes of processing and re-exporting – it also makes the product that is consumed domestically more expensive. Export levies also negatively impact the competitiveness of exported products by making them more expensive than they would be without the export levy. It is important to note that agronomic and horticultural products exported from Namibia do not face any export levies.

For example, the import levy of 5% on the importation of wheat has a negative impact on the competitiveness of the milling industry in Namibia when value-added products such as pasta are exported to other SACU countries. This is even though Namibia is a net importer of wheat. By not addressing this issue, there is a risk of prompting companies to consider relocating their operations to neighbouring countries. This potential move could endanger employment opportunities and destabilise the workforce, underscoring the possible adverse effects on the local economy.

The rebate will offset expensive wheat imports and allow for increased import volumes and increased food security levels within Namibia. It will allow for more competitive exports of pasta (and other wheat products), thus increasing the incentive to expand processing within Namibia and in turn increasing employment and improving the country's trade balance.

03. Expand capacity to address regulatory constraints, alignment of SPS and other trade protocols and provide support during trade negotiations, trade promotion, and advocacy

Enhancing local production and marketing within Namibia's agricultural sector, given the constraints of a relatively small domestic market, inherently underscores the importance of international markets for the growth and sustainability of the sector. While the NAB primarily focuses on supporting these local interventions, the natural progression towards seeking international market opportunities is a vital aspect of their supportive role. Aligning local production with the demands of the international market not only benefits local producers by providing broader avenues for their products but also enhances the variety and quality of goods available to local consumers, thereby indirectly contributing to the NAB's core mandate.

In this context, the exploration of international markets involves a nuanced understanding of regulatory constraints, particularly in the alignment of SPS measures and other trade protocols. While the NAB's direct involvement in trade negotiations, promotion, and advocacy might be limited, fostering an environment where local production is geared towards meeting international standards can indirectly facilitate access to new markets. This approach involves a broader collaboration beyond the NAB, as well as engaging with other government departments, the private sector, and overseas institutions to ensure that Namibian products are well-positioned and competitive on the global stage.

Moreover, by focusing on enhancing local production capabilities and marketing strategies that are attuned to the global marketplace, there is an opportunity to not only protect but also promote the interests of domestic producers and exporters. Creating awareness about Namibian agronomic and horticultural products in international markets can open doors to increased demand and access, thereby benefiting the country's economic development and trade balance. This strategic alignment between local production and international marketing opportunities offers a pathway to elevate the agricultural sector's contribution to Namibia's overall prosperity.

Ultimately, while the NAB's role may primarily concentrate on local production and marketing support, the intrinsic link between these activities and the expansion into international markets cannot be overlooked. By encouraging local producers to align their production with the needs and regulations of the international market, the NAB indirectly supports the opening of new avenues for Namibia's agricultural sector. This holistic approach not only underpins the sustainability of local production but also ensures that Namibia capitalises on the opportunities presented by the global market, thus enhancing the competitiveness and viability of its agricultural products.

6.1.6 Smallholder Farmers Transformation Interventions

Table 6.6 displays the Smallholder Farmers' Transformation Strategic Interventions.
Table 6.6: Smallholder Farmers' Transformation Strategic Interventions

Strategic theme/goal	1. Climate smart, inclusive, sustainable, and competitive crop value chain 2. A fair and conducive regulatory framework for optimising value chain operations
Strategic objective	1. To integrate small holder farmers into mainstream commercial crop production
Strategic Interventions	
Input	1. Facilitate and mobilise existing and where necessary establish capacity to improve access to inputs and technology transfer at primary production level (i.e. identify needs, identify capacity and address accordingly), through one stop farmer support centres at local level. 2. Establish and improve standard protocols for, amongst others, site selection, site preparation, soil preparation, crop selection, planting material, environmental impact assessment, biodiversity impact assessment, etc.
Production	1. Setup support centres that will be responsible for business development facilitation 2. Establish protocols, interventions and systems to improve efficient production practices that include, but are not limited to site management, risk issues, best practices, proper environmental protection, etc. 3. Establish mechanisms for effective information transfer through videos/onsite work training sessions 4. Establish mechanisms to provide access to production finance on a timely basis
Processing and value addition	1. Facilitate the linking of smallholder farmers to processors 2. Develop policies to facilitate value addition of agronomic and horticultural crops amongst smallholder farmers
Storage	1. Establish centralised storage/ collection centre facilities
Marketing	1. Establish and apply mechanisms to facilitate and improve market access and remove market barriers to new entrants
Export	1. Facilitate linking smallholder farmers with export value chains

The biggest constraint to the successful commercialisation of emerging farmers is maintaining access to suitable and sustainable markets. Access to affordable funding is also a constraint due to the lack of collateral. These two constraints are exacerbated by the lack of capacity of emerging farmers to produce consistent quality and quantity of products acceptable to the retail market as well as their inability to profitably supply these products to an ever more demanding, health and food safety conscious, consumer.

Research has shown that the successful commercialisation of emerging farmers depends on several key success factors, one being the incorporation of the farmer into a recognised value chain. Diagram 6 1 shows the interaction of the value chain, an enabling environment and the key success factors required to successfully integrate into the value chain.

Diagram 6 1: Emerging farmers' value chain participation
Source: OABS (2023)

Being part of a value chain creates an opportunity for the emerging farmer to access the mainstream agricultural sector and reduces the risk for all parties involved; hence, capacitating emerging farmers will create an opportunity to fully develop the agricultural sector, resulting in sustainable agribusinesses that will support structural transformation.

The success factors to successfully integrate into the value chain are:

- Trust and cooperation
- Governance
- Market power
- Innovation and upgrading
- Sound management
- Providing for own needs
- Access to finance
- Institutional support
- Dedication and progression
- Resources

Successful participation in the value chain implies consistency in the volume and quality to satisfy market demand needs.

The programme should aim to enable farmers to implement the key success factors required for successful industrialisation and commercialisation. The focus should be on skills transfer, market readiness, and market access. Hence, emerging farmers will be enabled to transition to an existing and recognised value chain.

Diagram 6.2 shows the typical capacity-building lifecycle to commercialise emerging farmers and integration into existing value chains.

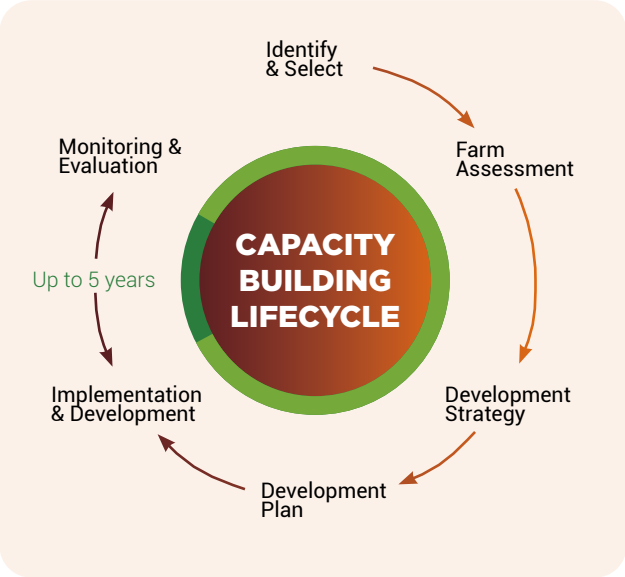


Diagram 6 2: Capacity building lifecycle
Source: OABS (2023)

The typical lifecycle of commercialising emerging farmers includes:

- Identify and select participating farmers
- Farm assessment
- Development of a strategy
- Development of a plan
- Implementation and development
- Monitoring and evaluation
- Graduation

Strong mentorship, skills transfer, and management development are essential elements to the successful implementation of such a development program.

6.1.7 Research and Development Interventions

R&D and technology transfer can be linked to all spheres and levels of the crop sector. Table 6 7 provides the strategic interventions pertaining to Research and Development and technology transfer.

Table 6 7: Research and development strategic interventions

Strategic theme/goal	1. Climate-smart, inclusive, sustainable, and competitive crop value chain 2. A fair and conducive regulatory framework for optimising value chain operations
Strategic objective	1. Promote a system of technological innovation and transfer to solve problems, open new frontiers and promote inclusivity to attract investments to grow crop value chains
Strategic Interventions	1. Facilitate, liaise, partner and support the DARD, and the National Commission on Research, Science and Technology (NCRST) to achieve the objectives of the NSTIP 2. Facilitate information and intelligence generation through evidence-based research 3. Upscale value chain research to improve the production, processing, storage, and marketing of crops in Namibia 4. Collaborate to establish crop research stations to support seed production

Investment in R&D is crucial to developing high-yielding crop varieties, and livestock genetics, and improving farming techniques to increase agricultural productivity and production (e.g., Adetutu & Ajayi, 2020; Jooste, Annandale, Chipembere, & Sihlobo, 2023). According to Fortunato and Enciso (2023), Namibia's agriculture sector has expanded its farmland since the 1990s without a substantial increase in yields. In contrast, peer countries have witnessed agricultural

growth attributable to enhanced productivity during the same period. The most recent report by ASTI (2016) shows that agricultural research spending by Namibia in constant and reached 180.9 million Namibian dollars in 2014. Although Fortunato and Enciso (2023) report that this is higher than peer countries (except South Africa), it has not translated into increased productivity. Note should furthermore be taken that although the total number of agricultural researchers per 100 thousand farmers rose steadily (and is on par or higher with peer countries), the growth was mainly directed to the fisheries sector and the University of Namibia's Faculty of Agriculture & Natural Resources (ASTI, 2016). Overall, only 29% of the country's Full Time Equivalent researchers conducted crop research (Cereals 16%, Roots and tubers 5%, Horticultural crops 4%, Pulses 3%, Oil-bearing crops 1%). Fisheries (30 per cent) and livestock (25 per cent) are other prominent areas of research (ASTI, 2016).

Thus, even though Namibia's agricultural research spending and the total number of agricultural researchers per 100 thousand farmers is higher than peer countries, spending has been moving sideways and has not translated into increased productivity. This is cause for serious concern considering the ability of the agricultural sector to create jobs, and contribute to rural development and food security. A well-functioning R&D system will also contribute to developing capacity and expertise levels of extension personnel in the country.

This should be viewed against the backdrop that according to the AU (2022), Africa almost doubled spending on the agricultural sector between 2000 and 2016, but agricultural R&D spending in the sector only increased at less than half that of overall spending. In this regard, cognisance must be taken of the significant return to public R&D investment. Vollaro et al. (2021) estimated returns on public R&D investments on agricultural productivity of between 6.5% and 15.2% for 16 European countries. Chancellor (2023) estimated that each additional AUS $1 of R&D investment could generate a return for farmers of about AUS $7.82.

According to Coe et al. (2009), institutional differences (although broadly defined in their study) shape the degree to which countries benefit from their own as well as external R&D investments via international knowledge spill-overs.

In this context, it is important to take cognisance of the following:

- ASTI (2016) reports that in 2009, the Namibian government approved plans to restructure the Directorate of Agricultural Research and Development (DARD) as a semi-autonomous research institute as a means of affording it greater flexibility in, amongst others, recruiting staff and offering competitive salary packages. ASTI (2016) emphasised that this new status is a strong first step towards addressing DARD's operating constraints at the time (including, but not limited to the funding model). Addressing these constraints is vitally important given the mandate of the DARD of: (i) conducting crop and livestock research, (ii) carrying out programmes for the conservation and preservation of plant and animal genetic material, (iii) conducting rangeland management and pasture research, (iv) improving the management of research plans, programmes, and projects at all levels, (v) implementing research agendas and priorities in line with the needs and demands of both small-scale and commercial farmers, and (vi) facilitating access to information and appropriate technology for all stakeholders and customers. Fortunato and Enciso (2023) report that the restructuring process is still pending. This means that DARD continues to be constrained by the funding model, while according to Fortunato and Enciso (2023), it still lacks semi-autonomy to recruit and train high-skilled staff. Thus, unfortunately, one can postulate that DARD remains stunted to actively and efficiently fulfil its mandate.

- Namibia also established the National Commission on Research, Science and Technology (NCRST) in 2012. Its mission is "To establish and strengthen a national system that promotes, develops and informs Research, Science, Technology and Innovation through effective coordination to realise a knowledge-based society." At NCRST, the Natural Sciences Research Division (NSRD) coordinates natural sciences-related research and emerging technologies in line with national development priorities (Malabo Montpellier Panel, 2022). According to the Malabo Montpellier Panel (2022), the Government of Namibia has recognised the importance of nature for the economic wellbeing and food security of its citizens and as such, commissioned the drafting of a national bio-economy strategy. The development of the strategy involves several government institutions and private organisations. Notably, the NAB is not mentioned as one of the organisations involved in the development of the bio-economy strategy, which seems odd considering the mandate of the NAB.

- The NSTIP was published in 2021 by the Ministry of Higher Education, Technology and Innovation (MHETI). According to MHETI (2021), the core mission of the NSTIP is to "entrench the production and application of Science, Technology and Innovation (STI) in all sectors of the economy to achieve the goals as set out in Vision 2030, national development plans and the global Sustainable Development Goals (SDGs)", and was designed to promote investment in R&D, technology development and innovation activities. The policy recognises that the MAWLR and its directorate, DARD, must participate in the implementation of a Revised NSTIP by determining national R&D and innovation priorities for implementation programmes.

- The NAB Strategic Plan (2019/20 – 2023-24) contains a strategic objective entitled "Provide a comprehensive and efficient information service on agronomy and horticulture" with interventions consisting of, amongst others, to "Conduct production and marketing research for agronomy and horticultural crops" and "Facilitate research on the impact of climate change/variability on the production of horticulture and agronomic crops".

Ensuring a cohesive and synchronised approach to research and development (R&D) as well as innovation activities within various institutions dedicated to the crop sector is of paramount significance. The imperative lies in fostering alignment among these entities to guarantee a unified and evidence-based research endeavour that optimally harnesses available resources. Such concerted efforts will not only enhance the effectiveness of R&D interventions but also promote synergy, thereby facilitating comprehensive advancements in the crop sector with a shared commitment to evidence-driven innovation and resource utilisation.

Furthermore, the crop subsector is also faced with research infrastructure for seed breeding and field trials, and hence there is a need for the NAB in collaboration with other

6.1.8 Cross-Cutting Strategic Interventions

The following strategic interventions are non-specific in terms of their influence on specific value chains. They are, at the same time, not specific to certain value chain positions (with the exception of the trade position) within Namibia's crop sector. However, they fall within the macro- and meso-environments. These interventions, if implemented in the correct manner and within the correct time frame, will capacitate almost every position within the different crop value chains of Namibia to become more competitive and efficient.

Table 6-8 shows strategic Interventions that could benefit the crop sector but fall outside the NAB mandate. NAB can however play an important advocacy and support role to promote these strategic Interventions.

Table 6 8: Cross-cutting strategic interventions

Strategic theme/goal	1. Climate-smart, inclusive, sustainable, and competitive crop value chain 2. A fair and conducive regulatory framework for optimising value chain operations	
Strategic objective	1. To foster, organise, and enable an environment that supports the development of crop value chains through proactive advocacy efforts	
Strategic Interventions		**Responsibility**
	1. Capacitation and upskilling of extension personnel, technology adoption, transfer, and mentorship programmes	MAWLR
	2. Upgrading of import and export infrastructure to facilitate increased trade	MWT
	3. 'Project Green Deal' – Assess the implications of the Farm to Fork strategy	MAWLR
	4. Establish a committee to investigate and recommend reforms for the deregulation of market-related policies in Namibia, with the goal of improving market efficiency, stimulating economic growth, and enhancing food security	MAWLR
	5. Establish sector-specific value chain roundtables	MAWLR
	6. Overhaul the Namibian SPS and import permit system to improve efficiency and reduce the cost of doing business	MAWLR
Strategic Interventions	7. Work permits • Develop a timelier work permit application and approval process	MHAISS
	8. Water i. Create a more transparent and efficient water license process inclusive of stakeholder consultations ii. Ensure accurate monitoring of water usage by water users of all scales iii. Ensure proper and continuous maintenance of aquifers iv. Ensure that mining exploration and mining in general do not harm Namibia's water resources v. Water-related infrastructure	MAWLR
	9. Investigate the simplification of the VAT system, removal of value-added tax on fresh fruits and vegetables and zero rate VAT on important inputs such as fertilisers, chemical remedies, animal feed and seed	MFPE & NAB
	10. Facilitate discussions to address the issue of high electricity costs for irrigated production	ECB & MME

01. Capacitation and upskilling of extension personnel, technology adoption, transfer, and mentorship programmes

Capacitation and upskilling of extension officers will be vitally important to increase the productivity of small-scale farmers since it will contribute towards income generation and food security. Equally important is having access to the newest technology for the Namibian context which will support productivity levels and competitiveness. A successful mentorship programme will reduce the strain being placed on the extension services system.

02. Upgrading of import and export infrastructure to facilitate increased trade

Cognisance should be taken that Walvis Bay harbour can serve as an important export hub for South African crop produce to the rest of the world (mostly the EU and UK) due to its location. This is especially relevant considering the infrastructure constraints at major South African harbours. Interventions are ongoing to explore exporting South African fruit via the Maputo harbour, for example. The Walvis Bay harbour offers the same opportunities, particularly to cargo destined for Europe. In particular, by upgrading and ensuring the efficient operation of the port for South African citrus fruit exports, the Namibian citrus fruit export industry may be afforded the opportunity to capitalise on the improvements. Collaboration between the South African and Namibian industries may promote the long-term sustainability of the export hub and ensure

maintained/improved competitiveness of the two industries' products on the international markets.

03. 'Project Green Deal' – Assess the implications of the Farm-to-Fork strategy

The Farm-to-Fork Strategy is an initiative of the EU that aims to create a more sustainable and resilient food system (European Commission (EC), 2020). It was introduced as part of the European Green Deal, which is a comprehensive plan to make Europe the world's first climate-neutral continent by 2050 (EC, 2020). The Farm-to-Fork Strategy, unveiled in May 2020, addresses various challenges related to food production, consumption, and distribution (EC, 2020). Its primary goals are to ensure food security, improve the sustainability of agricultural practices, promote healthy and environmentally friendly diets, and reduce food waste (EC, 2020). The strategy encompasses the entire food supply chain, from farmers and producers to consumers (EC, 2020). The Farm-to-Fork Strategy has implications for production practices, SPS standards and other regulations that are adopted in Namibia.

In light of the potential consequences of the EU Green Deal, it is crucial for Namibia to take proactive measures in assessing the implications of the Farm-to-Fork strategy. This will shed light on the ways in which Namibian producers/processors/traders can align their enterprise practices with the goals and strategies of the Farm-to-Fork strategy, in turn ensuring access to the EU market. With a competent and capacitated authority function with the issuance of export-ready permits and to conduct on-farm inspections for pests and diseases, it can be ensured that any products being exported are compliant with standards in export markets, in particular the EU. If implemented in compliance with the Farm-to-Fork strategy, this will also give Namibian crop exports a competitive advantage over other competing exporters.

04. Establish a committee to investigate and recommend reforms for the deregulation of market-related policies in Namibia, with the goal of improving market efficiency, stimulating economic growth, and enhancing food security

It should be noted that the term "market-related policies" explicitly excludes Consumer Protection and Quality Assurance Agricultural Policies. These frameworks are vital for maintaining product quality, ensuring food safety, and adhering to best practices. They are distinctly separate from any policies and regulations that may distort market conditions. For example, policies that artificially fix prices or offer extensive subsidies can lead to market distortions by influencing producers' decisions regarding resource allocation. Such interventions can result in the overproduction of certain crops or underinvestment in others, thereby hindering efficient resource allocation. In contrast, non-distortive policies such as those promoting market transparency and fair competition, generally enhance market efficiency by allowing supply and demand dynamics to guide resource allocation and production decisions more effectively. This not only benefits consumers who gain access to affordable, high-quality food but also enables producers to use resources more efficiently. By focusing on commodities and products that yield greater returns, producers can optimise their operations and contribute to a more robust and responsive market environment.

More specifically, Namibia's pricing system for grains is not linked to domestic production, but rather to SAFEX prices, with transport differentials and GMO premiums where applicable. Namibia also closes its borders to imports of selected grains between June and November (dates alternate depending on domestic production levels, etc.) when domestic producers are the sole providers of grains to the millers. Cognisance should be taken that the domestic price is hence not related to the Namibian climate conditions, e.g., in 2023, the price was low owing to low yields while in 2022 the price was high owing to high yields.

Apart from the misalignment between the pricing mechanism and local agro-economic conditions (climate), there is extensive global evidence suggesting that market regulations, particularly those directly influencing prices, contribute to inefficiencies in resource allocation and market distortions, ultimately impacting a nation's overall welfare. Recent challenges, including the global financial crisis, COVID-19, and the Russian-Ukraine war, have heightened concerns about food security, prompting governments to focus on issues of food sovereignty and self-sufficiency. Policy reforms aimed at achieving a more efficient allocation of scarce resources must carefully balance these objectives with Namibia's food security needs.

A more balanced market system is expected to enhance resource allocation, facilitate the cultivation of crops with a competitive edge, and bolster food security. This, in turn, is anticipated to elevate the total factor productivity of the crop sector. Furthermore, it will encourage the more effective utilisation and distribution of storage facilities in Namibia.

Acknowledging the potential advantages associated with a deregulated marketing system in Namibia, it is advisable to establish a committee representing all affected stakeholders to investigate and recommend reforms for the deregulation of market-related policies in Namibia, with the goal of improving market efficiency, stimulating economic growth, and enhancing food security.

It is also important to recognise that this investigative and reformative process will be meticulous and could extend over several years to ensure accuracy and comprehensiveness. This extended period will allow for in-depth, evidence-based research and extensive consultations. The implementation of any reforms should be thoroughly tested to minimize potential unintended consequences, thus ensuring that changes made are beneficial and sustainable. Moreover, significant resistance from beneficiaries of the current policies is anticipated, necessitating persistent and transparent engagement with all stakeholders to navigate these challenges effectively.

05. Establish sector-specific value chain roundtables

Low levels of collaboration between the private and public sectors have resulted in a lack of entrepreneurial programmes designed to upskill the entrepreneurial acumen of farmers and other players in the value chain. Furthermore, poor levels of support for Small- to Medium Enterprises (SMEs), and a lack of partnerships between R&D institutions exist both domestically and internationally.

The low levels of collaboration also mean that when policies are formulated, the views and opinions of relevant stakeholders are not considered. An example of this is when new policies are instituted, whereby the banking sector (financiers) is not consulted on how this policy may influence their credit lending stance in the agricultural sector – in effect, the banking sector is less incentivised to supply credit and production/expansion in the sector. This lack of collaboration and holistic policy formulation will continue to lead to inefficiencies.

In order to address this challenge, it is proposed to establish sector-specific value chain roundtables. This will improve the levels of problem-solving by the application of policies that are value-chain inclusive and that consider the impact on stakeholders. It would also allow for increased institutional

efficiency, increased buy-in from stakeholders of new policy imperatives, and more successful implementation of programmes.

06. Overhaul the Namibian SPS and import permit systems to improve efficiency and reduce the cost of doing business

During the consultation process, specific issues that were raised by stakeholders are as follows:

- Long lead times between application and issuance of phytosanitary permits by the MAWLR;
- The need to apply for 2 permits, i.e. an import permit issued by NAB and a phytosanitary permit issued by the Ministry of Agriculture, Water and Land Reform;
- Short import permit terms (some permits only last three months and some a year, in the case of fertilizer input suppliers, they are required to attain a permit per load in the fertilizer imported despite the fact that Namibia is a net importer of fertilisers);
- Regular changes to the regulations requiring the application for new import permits;
- The institution of phytosanitary permit regulations and requirements that are not applicable to the situation in Namibia (such as disease tests for diseases that do not even exist in the country); and
- The import permit system is paper-based, thus creating a significant administrative burden, adding to additional costs (for example courier costs) and causing delays in processing consignments.

To enhance the Sanitary and Phytosanitary (SPS) and import permit systems, the following recommendations are proposed:

i. **Streamline Permit Processing:** Implement measures to reduce the long lead times currently experienced in the application and issuance of phytosanitary permits by the MAWLR. This could involve adopting more efficient processing technologies or increasing staff to handle applications more promptly.

ii. **Extend Permit Validity:** Increase the duration of import permits, particularly for essential imports like fertilizers, to reflect the needs of Namibia as a net importer. Extending permit validity to at least one year or providing multi-load permits for certain bulk items can significantly reduce the administrative burden and costs associated with frequent applications.

iii. **Stabilise Regulatory Framework:** Minimise frequent changes to regulations that necessitate the application for new import permits. Establish a more stable regulatory environment by ensuring that any changes are made with ample notice and consultation with stakeholders to allow for smoother transitions and planning.

iv. **Customise Phytosanitary Requirements:** Review and adjust phytosanitary permit regulations and requirements to ensure that they are relevant to Namibia's specific context. This includes eliminating unnecessary disease tests for diseases not present in the country as a way to streamline the process and reduce costs.

v. **Digitalise the Permit System:** Transition the import permit system from paper-based to digital. This move would reduce the administrative burden, cut additional costs (such as courier fees), and expedite the processing of consignments. Implementing an online application and tracking system would make the process more efficient and transparent.

vi. Capacitate the staff members in the SPS permit system.

Adopting these recommendations would not only make the SPS and import permit systems more efficient and responsive to the needs of Namibia but also support the country's trade and economic development more effectively.

07. Work permits

The application for foreign work permits is also a stumbling block resulting in delays in activities that must take place during certain crucial times. For example, in the table grape industry, additional labour is required to conduct harvesting activities. The start of the harvest season can't be pinpointed exactly since it is determined by, amongst others, environmental factors. Delays to access harvesting teams when the crop is ready to be harvested can result in significant financial losses. In other instances, specialised skills not available in Namibia are required to do maintenance and or repairs on equipment and machinery. Long waiting times for work permits mean that equipment and machinery can't be used. A more streamlined work permit system will increase productivity in the crop sectors and will allow for improved knowledge transfer and collaboration.

i. Develop a timelier work permit application and approval process

This will ensure that work is available when needed and that any produce needed to be planted/harvested is not lost, thereby increasing yields and productivity on the farms. It will also encourage collaboration and knowledge transfer.

08. Water

During the consultation process, specific issues that were raised by stakeholders are as follows:

a. Slow and inefficient water licensing process that makes it difficult to access water usage rights,

b. The lack of transparency in the manner in which licenses are granted, and

c. The lack of water usage monitoring in the 'non-declared' water control areas.

In order to deal with the concerns raised and to address inefficiencies, the following strategic interventions are recommended.

i. Create a more transparent and efficient water license process inclusive of stakeholder consultations

This will ensure that water licenses are awarded to individuals with a sound business plan and access to land and that the rights are distributed in a timely and clear manner. This will drive up productivity and improve the ease of doing business.

ii. Ensure accurate monitoring of water usage by water users of all scales

Accurate data on water usage and the strain placed on the water supply in Namibia will be a useful tool in allocating future water rights and in planning for any potentially necessary water infrastructure installations. This will ensure long-term

sustained access to water in respective areas.

iii. Ensure proper and continuous maintenance of aquifers

This will ensure that in times of poor rainfall or drought there is sufficient access to water for producers to irrigate. This will ensure a year-round productive sector, thereby increasing investment, employment, and food security.

iv. Ensure that mining exploration and mining in general do not harm Namibia's water resources

This will ensure that safe and clean water is accessible to the crop sector in Namibia. In turn, it will ensure that the food produced is safe for human and animal consumption.

v. Water-related infrastructure

Namibia's climate is predominantly characterised by aridity and low rainfall, thus limiting the area that can be used for arable crops. Stakeholders have raised several concerns including the following:

- Poor maintenance of water-related infrastructure; and
- Underutilisation of the capacity of dams (specifically the Hardap dam), whilst there are continued interventions to develop additional irrigation projects.

Exploration and mining activities on or in proximity to freshwater basins could threaten the availability of fresh water and could lead to water quality degradation.

09. Investigate the simplification of the VAT system, removal of value-added tax on fresh fruits and vegetables and zero rate VAT on important inputs such as fertilisers, chemical remedies, animal feed and seed

Multiple stakeholders expressed the concern that the VAT system in Namibia constrains the potential growth of the crop sector.

The VAT system is complex, resulting in significant time delays in VAT refunds to value chain players (in some instances it is claimed that VAT refunds have not been made on valid VAT reclaims). This impacts negatively on the cashflow and hence on production activities and investments, thus reducing the ease of doing business.

In addition, the imposition of a 15% VAT on locally produced fruits and vegetables is creating a significant challenge for domestic producers, placing them at a competitive disadvantage against imported goods. This tax burden not only stifles the growth and development of the local market but also discourages the integration of smallholder farmers into the formal economy. Many of these farmers lack the sophisticated accounting systems necessary to navigate the complexities of VAT management. Their entry into formal markets is severely restricted, as the necessity to subtract VAT from their selling prices leads to lower farm gate prices. Consequently, these farmers are left with diminished incomes and limited opportunities for growth or development, thus perpetuating a cycle of disadvantage and inefficiency. Moreover, the current VAT policy not only impacts the financial viability of local fruit and vegetable producers but also contributes to broader economic and social issues. By limiting access to formal markets and reducing the competitiveness of local goods, the policy inadvertently encourages greater reliance on imported products, thus affecting the balance of trade and reducing the resilience of the local food supply. Furthermore, this situation exacerbates the difficulties faced by smallholder farmers who are often among the most vulnerable members of the rural economy, thereby deepening existing inequalities and hindering efforts towards inclusive economic development.

Namibian producers currently facing a 15% VAT on agricultural production inputs are placed at a significant disadvantage in terms of cash flow and regional competitiveness. This financial burden upfront increases the cost of essential inputs such as fertilisers, animal feed, and seeds, thus directly impacting producers' ability to manage their resources efficiently. As a result, they are constrained in their capacity to invest in their operations or adopt new technologies, hence putting them at a competitive disadvantage compared to producers in the region with more favourable tax policies such as South Africa, where similar inputs are exempt from VAT altogether for VAT registered producers. This discrepancy not only strains the financial viability of Namibian agricultural producers but also hampers the growth and sustainability of the sector within the regional market, emphasising the need for policy re-evaluation to foster a more competitive and resilient agricultural economy.

i. Create a more streamlined VAT system where payments are received timeously

With an effective VAT system, the ease of doing business will improve in the crop sector. If VAT refunds are received in a timely manner, this will alleviate strain on cash-flows to stimulate expansion in production and alternative investments.

ii. Investigation into the removal of VAT on fruits and vegetables

Adopting a policy of 0% VAT on fruits and vegetables is a pivotal measure towards enhancing the accessibility and affordability of nutritious food options for all consumers. This initiative, aimed at eliminating the additional tax, is anticipated to lead to a decrease in retail prices, thereby making these crucial dietary components more attainable for a broader segment of society. Such an adjustment is expected to foster a greater inclusion of fruits and vegetables in daily meals, thereby promoting healthier living.

The anticipated boost in consumer demand for these products will likely invigorate local market activity, thus prompting an increase in agricultural output as local farmers and producers escalate their efforts to accommodate the augmented needs. This growth in local production not only aids in reinforcing the agricultural industry but also plays a significant role in economic enhancement through job creation and the promotion of a resilient food ecosystem.

The strategic move to make fruits and vegetables more economically reachable is instrumental in advancing public health standards. A rise in the consumption of these vital foods correlates with diminished incidences of chronic illnesses, thus contributing to the overall well-being of the community. Hence, examining the potential removal of VAT on these items is essential, offering a pathway to not only uplift dietary practices but also to fortify the local agriculture sector, boost the economy, and improve health outcomes, thereby ensuring a comprehensive upliftment of societal welfare.

iii. Investigation into the VAT zero-rating of important production inputs

The implementation of a zero-rate VAT policy on agricultural production inputs such as fertilisers, chemical remedies, animal feed, and seeds, when procured from input suppliers, stands to significantly benefit producers by enhancing their cash flow dynamics. This strategic fiscal adjustment would decrease the immediate financial burden on producers, allowing them to allocate resources more efficiently and potentially reduce

the quantum of agricultural production loans. Such a policy harmonisation would also align domestic regulations with those in neighbouring South Africa, promoting a level playing field and fostering a more competitive agricultural sector regionally.

Moreover, the elimination of VAT on these critical inputs could act as a catalyst for increased investment within the agricultural sector. By reducing the upfront cost of essential materials, producers might be encouraged to expand operations, invest in new technologies, or improve production efficiencies, thereby enhancing overall productivity and sustainability.

The simplification of the VAT system through the introduction of a zero-rate on agricultural inputs would particularly benefit smallholder producers who are not VAT registered and, thus, currently unable to reclaim input VAT. This group, often facing the most significant financial constraints, would directly benefit from reduced input costs, enabling them to reinvest savings into their operations, improve product quality, and expand their market reach.

Moreover, investigating the impact of applying a zero-rate VAT on agricultural production inputs is crucial for understanding its potential to enhance the financial health and competitiveness of producers, particularly in a market that competes regionally. Such analysis can illuminate how this policy could drive increased investment in the agricultural sector, leading to greater productivity, sustainability, and economic growth. Additionally, it is vital to assess how this change would specifically support smallholder producers who are critical for food security yet often are the most financially vulnerable.

09. Facilitate discussions to address the issue of high electricity costs for irrigated production

Electricity cost in Namibia is one of the major costs influencing the competitiveness of irrigated crop production due to high temperatures aggravated by frequent production. Hence there is a need for the NAB and other role players to engage the Ministry of Mines and Energy to look into this matter. The lowering of tariffs for irrigated production will stimulate the appetite for irrigated production amongst farmers and hence contribute to the food security agenda.

6.2 PRIORITY CROPS PER PRODUCTION ZONE

To prioritise crops at a lower level per production zone several criteria were used, including selected agroecological characteristics of each production zone, crop requirements such as soils and water, and the suitability of crop production. Table 6 9 only shows the crops that have a high priority per production zone due to the limited suitability for crop production as shown in Table 6-9 below.

KAVANGO	ZAMBEZI	KARST	NORTH CENTRAL	CENTRAL	SOUTH	ORANGE RIVER
Grains: White maize Wheat Pearl millet Sugarcane Rice Yellow Maize	**Grains:** White maize Wheat Pearl millet Sugarcane Rice Yellow Maize	**Grains:** White maize Wheat Pearl Millet Yellow Maize	**Grains:** White maize Wheat Pearl Millet Sugarcane Rice Yellow Maize	**Grains:** White maize Wheat Pearl Millet Yellow Maize	**Grains:** White Maize Wheat Yellow Maize	
Oil seeds: Sunflower Canola Sesame Olives Soybeans	**Oil seeds:** Sunflower Canola Sesame Olives Soybeans	**Oil seeds:** Sunflower Canola Sesame Olives Soybeans	**Oil seeds:** Sunflower Canola Sesame Olives Soybeans	**Oil seeds:** Sunflower Canola Sesame Olives Soybeans	**Oil seeds:** Sunflower Canola Sesame Olives Soybeans	
Legumes and nuts: Beans (all types) Groundnuts Pecan Macadamia Cashew	**Legumes and nuts:** Beans (all types) Groundnuts Pecan Macadamia Cashew	**Legumes and nuts:** Beans (all types) Groundnuts Pecan Macadamia Cashew	**Legumes and nuts:** Beans (all types) Groundnuts Pecan Macadamia Cashew	**Legumes and nuts:** Beans (all types) Groundnuts Pecan Macadamia Cashew	**Legumes and nuts:** Beans (all types) Groundnuts	
Fruits: Table grapes Dates Citrus fruits Mango Avocado Banana Berries Kiwi	**Fruits:** Table grapes Dates Citrus fruits Mango Avocado Banana Berries Kiwi	**Fruits :** Banana Kiwi Mango Citrus fruits Berries	**Fruits:** Table grapes Dates Citrus fruits Mango Avocado Banana Berries Kiwi	**Fruits :** Table Grapes Dates Citrus fruits Mango Avocado Berries	**Fruits :** Table Grapes Dates Citrus fruits Mango Avocado Berries	**Fruits :** Table Grapes Dates Mango Citrus fruit Berries
Vegetables: Potato Onion Tomato Butternuts Sweet pepper Lettuce Sweet potato	**Vegetables:** Potato Onion Tomato Butternuts Sweet pepper Lettuce Sweet potato	**Vegetables:** Potato Onion Tomato Butternuts Sweet pepper Lettuce Sweet potato	**Vegetables:** Potato Onion Tomato Butternuts Sweet pepper Lettuce Sweet potato	**Vegetables:** Potato Onion Tomato Butternuts Sweet pepper Lettuce Sweet potato	**Vegetables:** Potato Onion Tomato Butternuts Sweet pepper Lettuce Sweet potato	**Vegetables:** Potato Onion Tomato Butternuts Sweet pepper Lettuce Sweet potato

NB: Please also see attached Appendix A: Priority crops per production zone according to climatic and soil suitability

07

IMPLEMENTATION ACTION PLAN

Section 7 unpacks the Implementation Action Plan per Value Chain Intervention, i.e., Inputs, Production, Processing, Marketing, Trade (export), as well as Research and Development and Smallholder Farmer development. Key Performance Indicators (KPI), targets and strategic Interventions are linked to each strategic objectives and goals.

7.1 VALUE CHAIN INTERVENTIONS IMPLEMENTATION PLAN

Strategic goal:

1. Climate-smart, inclusive, sustainable, and competitive crop value chain
2. A fair and conducive regulatory framework for optimising value chain operations

Table 7 1: Input Value Chain Interventions

STRATEGIC OBJECTIVE	KPI	TARGETS PER FINANCIAL YEAR						STRATEGIC INTERVENTIONS	RESPONSIBLE ORGANISATION	ESTIMATED COST (N$)	FUNDING SOURCE
		Baseline	2025/26	2026/27	2027/28	2028/29	2029/30				
01. Development of an environmentally sustainable, efficient and cost-effective local input industry to support the competitiveness of the crop sector.	Number of commercial and surplus crop farmers accessing quality and affordable key production inputs.	**1,000**	**1,500**	**2,000**	**2,500**	**3,000**	**3,500**	1. Adopt new chemical labeling standards worldwide in accordance with the Globalized Harmonised System (GHS) and sensitise domestic users to the new chemical standards.	MAWLR/NAB	500,000.00	NAB
								2. Facilitate an investigation into the financial feasibility for the construction of a fertilizer blending and mixing plant at Walvis Bay through a Public Private Partnership (PPP).	NAB	1,000,000.00	NAB
								3. Facilitate the signing of the International Union for the Protection of New Varieties of Plants (UPOV) agreement.	MAWLR/ NAB	200,000.00	MAWLR /NAB
								4. Support the implementation of the Seeds and Seed Varieties Act (Act 23 of 2018).	NAB	1,000,000.00	NAB
								5. Ensure that farmers, both small-scale and commercial, have seamless access to essential inputs such as good quality seed and fertilisers.	NAB	5,000,000.00	NAB
								6. Promote local production of improved and certified seeds for staple crops (e.g. pearl millet).	NAB		NAB
								7. Promote the use of technology to improve crop productivity i.e irrigation, planting, weeding, harvesting and threshing.	NAB/NCRST	1,000,000.00	NAB
TOTAL BUDGET										**37,700,000.00**	

Table 7.2: Production Value chain Interventions

STRATEGIC OBJECTIVE	KPI	TARGETS PER FINANCIAL YEAR						STRATEGIC INTERVENTIONS	RESPONSIBLE ORGANISATION	ESTIMATED COST (N$)	FUNDING SOURCE
		Baseline	2025/26	2026/27	2027/28	2028/29	2029/30				
02. To cultivate a conducive production environment, fostering consistent and reliable supplies of farm produce to sustain crop value chains.	Increase in local commercial production tonnage of controlled agronomic and horticultural crops.	**200,000**	**220,000**	**240,000**	**260,000**	**280,000**	**300,000**	1. Promote upscaling of cash crop production and increasing crop productivity.	NAB	5,000,000.00	NAB
								2. Facilitate the production potential of alternative high value crops.	NAB	10,000,000.00	NAB
								3. Facilitate transformation of all the Green Schemes.	MAWLR		MAWLR
								4. Conduct more accurate and timely crop production estimates.	NAB	5,000,000.00	NAB
								5. Build resilience to climate change by promoting irrigated crop production and cultivation of drought tolerant crops.	NAB	50,000,000.00	NAB & Partners
								6. Amend and where necessary engage in the design of policies to ensure and enhance food safety and quality.	NAB	2,000,000.00	NAB
								7. Review, harmonisation and collaboration - SPS standards.	MAWLR, NAB	1,000,000.00	MAWLR, NAB
								8. Design and implement customized skills development and capacity-building programs.	NAB	5,000,000.00	NAB
								9. Deliver relevant and timely information and services to farmers and other value chain role players.	NAB	2,000,000.00	NAB
								10. Develop and implement a crop insurance plan for producers.	NAB		
TOTAL BUDGET										**80,000,000.00**	

Table 7.3: Processing/ Value Addition Value Chain Interventions

STRATEGIC OBJECTIVE	KPI	TARGETS PER FINANCIAL YEAR						STRATEGIC INTERVENTIONS	RESPONSIBLE ORGANISATION	ESTIMATED COST (N$)	FUNDING SOURCE
		Baseline	2025/26	2026/27	2027/28	2028/29	2029/30				
03. Develop and support competitive and inclusive local value addition by fostering a conducive investment and business climate.	Increase in share of % of agronomic and horticultural production tonnage processed into diverse products	**41%**	**42%**	**45%**	**50%**	**55%**	**60%**	1. Facilitate opportunities to expand domestic processing/ value addition capacity through the agro-processing scheme	NAB	31,010,000.00	NAB & Partners
								2. Develop standards to ensure and enhance food safety and quality of processed products.	NAB/ NSI		
TOTAL BUDGET										**31,010,000.00**	

Table 7.4: Marketing Value Chain Interventions

STRATEGIC OBJECTIVE	KPI	TARGETS PER FINANCIAL YEAR						STRATEGIC INTERVENTIONS	RESPONSIBLE ORGANISATION	ESTIMATED COST (N$)	FUNDING SOURCE
		Baseline	2025/26	2026/27	2027/28	2028/29	2029/30				
04. To facilitate and promote efficient and effective marketing arrangements.	Increased domestic market share (%) of locally produced agronomic and horticultural crops.	**35%**	**40%**	**45%**	**50%**	**55%**	**60%**	1. Facilitate bridging finance mechanisms through silo certification.	NAB	200,000.00	NAB
								2. Address storage capacity constraints in Namibia.	NAB	10,000,000.00	NAB
								3. Promote and facilitate the marketing of locally produced products.	NAB	2,500,000.00	NAB
								4. Facilitate the revitalization process of the fresh produce business hubs to function optimally.	AMTA/NAB	4,000,000.00	AMTA/NAB
TOTAL BUDGET										**16,700,000.00**	

Table 7.5: Trade Value Chain Interventions

STRATEGIC OBJECTIVE	KPI	TARGETS PER FINANCIAL YEAR						STRATEGIC INTERVENTIONS	RESPONSIBLE ORGANISATION	ESTIMATED COST (N$)	FUNDING SOURCE
		Baseline	2025/26	2026/27	2027/28	2028/29	2029/30				
05. Facilitate trade promotion and advocacy to grow lucrative international and intra-regional trade.	Growth (%) in export tonnage of agronomic and horticultural crops	**35%**	**40%**	**45%**	**50%**	**55%**	**60%**	1. Export market development programme/ scheme	NAB	5,000,000.00	NAB
								2. Investigate the possibility of introducing an import levy rebate on exports of processed controlled products manufactured from imported raw materials as well as other export incentives in broad.	NAB	500,000.00	NAB
								3. Expand capacity to address regulatory constraints, alignment of SPS and other trade protocols and provide support during trade negotiations, trade promotion, and advocacy both local and international.	MAWLR, NAB	10,500,000.00	MAWLR, NAB
TOTAL BUDGET										**16,000,000.00**	

Table 7.5: Trade Value Chain Interventions

VALUE CHAIN	STRATEGIC OBJECTIVE	KPI	TARGETS PER FINANCIAL YEAR						STRATEGIC INTERVENTIONS	RESPONSIBLE ORGANISATION	ESTIMATED COST (N$)	FUNDING SOURCE
			Baseline	2025/26	2026/27	2027/28	2028/29	2029/30				
Input	**06.** To integrate small holder farmers into mainstream commercial crop production	Number of smallholder crop farmers accessing quality and affordable key production inputs.	**200**	**250**	**300**	**400**	**450**	**500**	1. Facilitate and mobilising existing and where necessary establish capacity to improve access to inputs and technology transfer at primary production level (i.e. identify needs, identify capacity and address accordingly), through one stop farmer support centers at local level.	NAB	2,500,000	NAB
									2. Establish and improve standard protocols for, amongst others, site selection, site preparation, soil preparation, crop selection, planting material, environmental impact assessment, biodiversity impact assessment, etc.	NAB	2,000,000	NAB
Production		Increased share (%) of local production from smallholder farmers.	**5%**	**10%**	**13%**	**15%**	**18%**	**20%**	1. Setup support centers that will be responsible for business development facilitation.	NAB	10,000,000	NAB
									2. Establish protocols, interventions and systems to improve efficient production practices that include, but are not limited to site management, risk issues, best practices, proper environmental protection, etc.			
									3. Establish mechanisms for effective information transfer through videos/ onsite work training sessions.			
									4. Establish mechanisms to provide access to production finance on a timely basis.			

VALUE CHAIN	STRATEGIC OBJECTIVE	KPI	TARGETS PER FINANCIAL YEAR						STRATEGIC INTERVENTIONS	RESPONSIBLE ORGANISATION	ESTIMATED COST (N$)	FUNDING SOURCE
			Baseline	2025/26	2026/27	2027/28	2028/29	2029/30				
Processing/ Value addition		Increase in % of local agronomy and horticulture production tonnage from smallholders farmers processed.	**1%**	**2%**	**4%**	**6%**	**8%**	**10%**	1. Facilitate processors to link smallholder farmers to processing initiatives. 2. Develop policies to facilitate value addition of agronomic and horticultural crops amongst smallholder farmers	NAB	5,000,000	NAB
Storage		Number of of smallholder farmers aacesing good storage facilities	**100**	**200**	**500**	**1000**	**1500**	**2000**	1. Ensure access to good storage facilities for smallholder	NAB	10,000,000	NAB
Marketing		% Increase in local production marekted locally by smallholder farmers	**2%**	**4%**	**8%**	**12%**	**16%**	**20%**	1. Establish and apply mechanisms to facilitate and improve market access and removal of market barriers to new entrants.	NAB	10,141,600	NAB
Trade		Growth (%) in export of agronomic and horticultural crops from smallholder farmers	**0%**	**2%**	**4%**	**6%**	**8%**	**10%**	1. Facilitate linking smallholder farmers with export value chains.	NAB	2,500,000	NAB
TOTAL BUDGET											**37,141,600**	

Table 7.7: Research and Development Interventions

STRATEGIC OBJECTIVE	KPI	TARGETS PER FINANCIAL YEAR						STRATEGIC INTERVENTIONS	RESPONSIBLE ORGANISATION	ESTIMATED COST (N$)	FUNDING SOURCE
		Baseline	2025/26	2026/27	2027/28	2028/29	2029/30				
07. Promote a system of technological innovation and transfer to solve problems, open up new frontiers and promote inclusivity in order to attract investments to grow crop value chains	Number of research projects implemented to increase crop value chain development.	**16**	**4**	**4**	**4**	**4**	**4**	1. Facilitate, liaise, partner and support the DARD, and the National Commission on Research, Science and Technology (NCRST) to achieve the objectives of the Revised National Science, Technology and Innovation Policy (NSTIP).	NAB, MAWLR, NCRST, UNAM, NUST	2,000,000	NAB, MAWLR, NCRST, UNAM, NUST
								2. Facilitate information and intelligence generation through evidence-based research. Conduct research to improve the production, processing, storage, and marketing of controlled crops.			
								3. Upscale value chain research to improve the production, processing, storage, and marketing of crops	NAB	5,679,680	NAB
	Number of crop research stations established in strategic locations	**0**	**0**	**1**	**0**	**0**	**1**	4. Collaborate to establish crop research stations to support seed breeding and production.	NAB &Partners	12,718,720	NAB &Partners
TOTAL BUDGET										**20,398,400.00**	

Table 7.8: Cross-Cutting Interventions

STRATEGIC OBJECTIVE	KPI	TARGETS PER FINANCIAL YEAR						STRATEGIC INTERVENTIONS	RESPONSIBLE ORGANISATION	ESTIMATED COST (N$)	FUNDING SOURCE
		Baseline	2025/26	2026/27	2027/28	2028/29	2029/30				
08. To foster, organize, and enable an environment that supports the development of crop value chains through proactive advocacy efforts	Progress (%) made towards addressing cross cutting interventions	**0%**	**20%**	**40%**	**60%**	**80%**	**100%**	1. Capacitation and upskilling of extension personnel, technology adoption, transfer, and mentorship programs.	MAWLR/NAB	5,000,000	MAWLR/NAB
								2. Upgrading of import and export infrastructure to facilitate increased trade.	MWT	0	MWT
								3. 'Project Green Deal' – Assess the implications of the Farm to Fork strategy.	MIT	0	MIT
								4. Establish a committee to investigate the phased deregulation of Namibia's staple crop industry, aiming for optimal resource utilization, job creation, and enhanced food security.	NAB	500,000	NAB
								5. Establish sector specific value chain roundtables.	NAB	2,000,000	NAB
								6. Overhaul the Namibian SPS and import permit system to improve efficiency and reduce the cost of doing business.	MAWLR	2,000,000	MAWLR
								7. Work permits Develop a timelier work permit application and approval process.	MHAISS	0	MHAISS
								8. Water i. Create a more transparent and efficient water license process inclusive of stakeholder consultations. ii. Ensure accurate monitoring of water usage by water users of all scales.	MAWLR	1,000,000	MAWLR

STRATEGIC OBJECTIVE	KPI	TARGETS PER FINANCIAL YEAR						STRATEGIC INTERVENTIONS	RESPONSIBLE ORGANISATION	ESTIMATED COST (N$)	FUNDING SOURCE
		Baseline	2025/26	2026/27	2027/28	2028/29	2029/30				
								iii. Ensure proper and continuous maintenance of aquifers. iv. Ensure that mining exploration and mining in general do not harm Namibia's water resources. v. Water related infrastructure.			
								9. Investigate the simplification of the VAT system, removal of Value-added tax on fresh fruit and vegetables and zero rate VAT on important inputs such as fertilisers, chemical remedies, animal feed and seed.	NAB	500,000	NAB
								10. Facilitate discussions to address the issue of high electricity cost for irrigated production.	ECB/ MME	50,000	ECB/MME
TOTAL BUDGET										**11,050,000**	

08

CRITICAL SUCCESS FACTORS

8.1 Responsive organisational structure

In today's dynamic business landscape, a responsive organisational structure is crucial. Unlike traditional hierarchies, it swiftly adapts to market shifts, technological advances, and customer preferences. The ideal structure should enhance decision-making speed, fostering collaboration and streamlining communication. It should encourage innovation and agility, thereby empowering employees to contribute ideas and adapt effectively to change. The emphasis on flexibility ensures that organisations navigate uncertainties, thereby staying relevant and resilient in the evolving business environment.

When contemplating organisational structure, it is essential to consider the criteria for an effective organisational structure. This involves aligning the NAB to best support the strategic objectives and strategic interventions of the Five-Year Crop Value Chain Strategy by defining roles and responsibilities clearly, establishing decision-making clarity for accountability, reducing customer/stakeholder disruptions caused by handoffs, minimising the customer/stakeholder "run-around," avoiding confusion over responsibilities, fostering collaboration among closely working individuals, ensuring unrestricted information flow to relevant parties, maintaining manageable spans of control, and complementing this with informal channels for cross-boundary communication.

8.2 Financial Resource Allocation

The effective execution of any plan necessitates financial resources for carrying out annual action steps. Notably, the NAB's income is derived from agronomic and horticulture levies, along with administration fees outlined in the Agronomic Industry Act, Act 20 of 1992. Allocating levies to targeted interventions as per the crop value chain strategy and implementation plan is crucial for the NAB to enhance the promotion of the crop sector value chain, encompassing inputs, production, processing, storage, marketing, trade, research and development as well as smallholder farmer development. This should be in compliance with the Agronomic Industry Act.

8.3 Effective performance management system

An effective performance management system is something every organisation wants. Without driven employees who are performing well, a business cannot achieve its full potential. Therefore, the NAB requires a good performance management system that works towards the improvement of the overall organisational performance by managing the performance of the team and individuals to ensure the successful implementation of the Five-Year Crop Value Chain Strategy. An effective performance management system can play a very crucial role in managing the performance of the NAB.

Therefore, it is paramount that employees understand the importance of their contributions to the NAB crop value chain strategic objectives. This includes making sure that every employee understands what is expected from them and equally ascertaining whether the employees possess the required skills and support for fulfilling such expectations. Ensuring the proper alignment of strategic objectives and facilitating effective communication throughout the NAB is of paramount importance. Finally, facilitating a cordial and harmonious relationship between an individual employee and the line manager based on trust and empowerment cannot be overemphasised.

8.4 Effective communication

Effective communication is an important factor in the success of implementing the Five-Year Crop Value Chain Strategy. Ineffective NAB communication will result in poor execution of strategic interventions and associated actions. It is imperative that the NAB takes advantage of information communication technology (ICT) solutions that are aimed at effective communication.

8.5 Good stakeholder relations

The NAB crop value chain strategic interventions are not achieved entirely by the NAB but through the collective contribution and efforts of many key stakeholders internally and externally. Therefore, stakeholders' contribution is key to the successful implementation of the Five-Year Crop Value Chain Strategy and Implementation Plan and should be acknowledged and monitored. Therefore, information dissemination is of primary importance to maintain strategic relationships with its stakeholders.

8.6 Regulatory framework

It is fundamental in the execution of the NAB crop value chain strategy that its implementation be within the Namibian legal framework. Full compliance with the regulatory framework that governs the NAB will reduce conflict, duplication of functions, and clear reporting as guided by its legal framework.

09

BUDGET SUMMARY AND FUNDING SOURCE

The NAB will raise funds from its sources into the Crop Development Fund to finance the implementation of the Crop Value Chain Development Strategy over five years, and a total amount of approximately N$50 million annually or N$250 million in 5 years will be required for the implementation of the strategy. In addition to NAB funding, the NAB will also lobby for technical or financial support from key institutions/partners of interest to finance at least 5% of the total budget. See below the budget summary per Value Chain for each priority area.

Value Chain Interventions and Budget

VALUE CHAIN INTERVENTIONS	BUDGET 5-YEAR (N$)	BUDGET PER ANNUM (N$)
Input value chain	37,700,000	7,540,000
Production value chain	80,000,000	16,000,000
Processing value chain	31,010,000	6,202,000
Marketing value chain	16,700,000	3,340,000
Trade value chain	16,000,000	3,200,000
Smallholders Farmer Transformation	37,141,600	7,428,320
Research and Development	20,398,400	4,079,680
Cross Cutting Intervention	11,050,000	2,210,000
Total	**250,000,000**	**50,000,000**

10

MONITORING AND EVALUATION

A standard monitoring and evaluation (M&E) plan for implementing a strategy encompasses detailed steps and processes to ensure the strategy's effectiveness, monitor progress, and assess outcomes. The comprehensive outline is as follows :

1. Define Objectives and Goals

- **Establish Clear Objectives:** Define the specific, measurable, achievable, relevant, and time-bound (SMART) objectives of the strategy
- **Identify Key Performance Indicators (KPIs):** Determine the metrics that will be used to measure progress towards these objectives

2. Develop the M&E Framework

- **Logic Model/Theory of Change:** Create a visual representation that outlines the inputs, activities, outputs, outcomes, and impacts of the strategy
- **Baseline Data Collection:** Gather initial data before implementation to serve as a benchmark for future comparisons

3. Data Collection Methods

- **Quantitative Methods:** Surveys, questionnaires, and administrative data to capture numerical data on performance indicators
- **Qualitative Methods:** Interviews, focus groups, and case studies to gather detailed insights and understand context

4. Data Collection Plan

- **Frequency:** Establish how often data will be collected (e.g., monthly, quarterly, annually)
- **Sources:** Identify the sources of data (e.g., internal records, external reports)
- **Responsibility:** Assign specific roles and responsibilities for data collection to team members

5. Data Analysis

- **Techniques:** Use statistical methods and qualitative analysis techniques to interpret the data
- **Tools:** Employ relevant software and tools for data analysis

6. Reporting

- **Regular Reports:** Prepare periodic reports (e.g., quarterly, annually) to communicate progress to stakeholders
- **Dashboards:** Develop real-time dashboards to visualise key metrics and trends

---

[3]PMI's PMBOK (Project Management Body of Knowledge), UNDP's Handbook on Planning, Monitoring, and Evaluating for Development Results, World Bank M&E, IFAD Evaluation Manual, The Organisation for Economic Co-operation and Development (OECD) Development Assistance Committee (DAC), Logical Framework Approach (LFA).

- Final Evaluation Report: At the end of the strategy period, compile a comprehensive report that summarises findings, assesses goal achievement, and provides recommendations

7. Feedback and Adaptation

- Stakeholder Meetings: Conduct regular meetings with stakeholders to review findings and gather feedback
- Continuous Improvement: Use M&E findings to make data-driven adjustments to the strategy, ensuring it remains effective and relevant

8. Dissemination

- Sharing Results: Communicate the outcomes and lessons learned through workshops, publications, and online platforms to a broader audience

9. Capacity Building

- Training: Provide training sessions for staff on M&E processes, tools, and techniques.
- Support: Establish support systems, such as technical assistance and resources, to aid in effective M&E implementation

Table 10.1 is an example of a Simplified M&E Plan.

Table 10.1: Simplified M&E Plan

COMPONENT	BUDGET 5-YEAR (N$)
Objectives	Increase crop yield by 20% within two years
KPIs	Yield per hectare, percentage of farmers adopting new seeds
Baseline Data	Current yield data, existing seed usage statistics
Data Collection Methods	Monthly surveys, quarterly focus groups
Frequency	Monthly (quantitative), Quarterly (qualitative)
Responsibility	Field officers for data collection, M&E team for analysis
Reporting	Quarterly progress reports, annual comprehensive review
Feedback	Quarterly stakeholder meetings, continuous strategy refinement based on feedback
Dissemination	Annual conference, publication of findings online
Capacity Building	Workshops on data collection methods, ongoing technical support

By following a structured approach, the M&E plan ensures that the strategy is effectively tracked and evaluated, leading to better outcomes and more efficient use of resources.

REFERENCES

Business Scouts for Development (BSD). (2020). Sector Brief Namibia: Agriculture [Online]. Available: https://www.giz.de/en/downloads/giz2022-en-namibia-agriculture.pdf [2023, May 4].

DALRRD. (2020). Strategic Plan [Online]. Available: https://www.dalrrd.gov.za/phocadownloadpap/Strategic_Plan/Strategic%20Plan%202020-2025.pdf [2024, March 8]

Emilie M Abraham. (n.d.). Namibia - Trade and Investment Opportunities in the crop industry. NAB.

Hattingh, E. (2022). Namibian Sun. Retrieved from Namibian Citrus may see boom [Online]. Available: https://www.namibiansun.com/agriculture/namibia-may-seecitrus-boom2022-05-27/ [2023, July 3].

Letaba Herald. (2021). Massive increase in production at ZZ2's date orchards in Namibia. Retrieved from https://letabaherald.co.za/98753/massive-increase-inproduction-at-zz2s-date-orchards-in-namibia/
MAWF. (2013). Namibia Seed Policy [Online]. Available: https://www.nafsan.org/wp-content/uploads/2021/08/Seed-Policy-Namibia-2013.pdf [2023, October 15].

Liu, X. & Zhou, J. (2021). Assessment of the continuous extreme drought events on Namibia during the last decade. Water, 13 (20), 1-18.
Frost, B. (2000). Measuring performance. Measurement International.

NAB. (2017). Mahangu Development Strategic Plan 2017-2020. NAB

NAB. (2019). Annual Report. NAB

NAB. (2019a). Strategic Plan 2019/20 – 2023/24 [Online]. Available: https://www.nab.com.na/wp-content/uploads/2020/10/Strategic-Plan-final-24-April-2019.pdf [2024, March 5].

NAB. (2020). Crop Prospects and Food Security Assessment Report for the Marketing Season 2019/2020. [Online]. Available: http://www.nab.com.na/wp-content/uploads/2020/09/Final-FSAR-2019-20-as-of-31-May-2020.pdf [2023, July 28].

NAB. (2021). Market intelligence report: Wheat grain. Issue 1 of 2021. NAB

NAB. (2021a). Market intelligence report - Potatoes. NAB

NAB. (2021b). Market intelligence report - Onion. NAB

NAB. (2021c). Market Intelligence report - Carrots. NAB

NAB. (2021e). Rapid assessment of cowpea production and marketing in Namibia: Final report [Online]. Available: https://www.nab.com.na/wp-content/uploads/2022/04/RAPID-ASSESSMENT-OF-COWPEA-PRODUCTION-AND-MARKETING-IN-NAMIBIA-_-Final.pdf [2023, September 6].

NAB. (2021f). Pearl millet (mahangu) preliminary production forecast report: Harvesting/marketing season (2021/2022) [Online]. Available: https://www.nab.com.na/wp-content/uploads/2021/05/B-Pear-Millet-production-forcast-report-2021.pdf [2023, September 5].

NAB. (2022). Grain Marketing Progress Report 2021/2022. NAB

NAB. (2022b). Grain stats and graphs. NAB

NAB. (2022c). Market intelligence report - Berries and citrus fruits. NAB

NAB. (2022d). Market intelligence report - White maize. NAB

NAB. (2022e). Regulations relating to the local production and trading of controlled products: Agronomic Industry Act, 1992 [Online]. Available: https://www.nab.com.na/downloads/ [2023, March 02].

NAB. (2022f). Pearl millet statistics. [Online]. Available: https://www.nab.com.na/agronomy/grain-statistics/#1657790629327-608520afda3f [2023, Aug 02].

NAB. (2022g). Wheat production forecast report: Harvesting/marketing season (2021/2022) [Online]. Available: https://www.nab.com.na/wp-content/uploads/2021/09/Expected-wheat-production-forecast-report-20212-2022-Marketing-Season.pdf [2023, September 5].

NAB. (2022h). Horticulture: Vegetable production forecast reports_1,2, & 3 [Online]. Available: https://www.nab.com.na/wp-content/uploads/2023/02/Vegetable-Production-Forecast-Reports-01-03-to-31-07-2023.pdf [2023, October 4].

NAB. (Aug 2022). Baseline study regarding the status quo of fruit production in Namibia. [Online]. Available: https://www.nab.com.na/wpcontent/uploads/2023/01/Baseline-study-regarding-the-status-of-fruits-productionin-Namibia-20221205-1.pdf [2023, Aug 02].

NAB. (2023). Horticulture Overview [Online]. Available: https://www.nab.com.na/horticulture/horticulture-overview/ [2023, July 28].

NAB. (2023b). The potential of processing fruits and vegetables in Namibia [Online]. Available: https://www.nab.com.na/wp-content/uploads/2023/03/Researcharticle-THE-POTENTIAL-OF-PROCESSING-FRUITS-AND-VEGETABLES-IN-NAMIBIA.pdf [2023, July 28].

NAB. (2023c). White maize [Online]. Available: https://www.nab.com.na/agronomy/white-maize/ [2023, July 20].

NAB. (2023d). Wheat [Online]. Available: https://www.nab.com.na/agronomy/wheat/#:~:text=The%20main%20wheat%20production%20areas,farms%20in%20the%20Maize%20Triangle. [2023, September 5].
Nagolo, M. & Alweenda, N. (2020). Democracy report. Institute for Public Policy Research.

Namport. (2023). Harambee Prosperity Plan [Online]. Available: https://www.namport.com.na/about-namport/harambee-prosperity-plan/495/ [2023, May 4].

National Planning Commission. (2017). Namibia's 5th National Development Plan (NDP5) [Online]. Available: https://www.npc.gov.na/national-plans/national-plansndp-5/ [2023, May 5].

New Era Live. (2018, April 10). Namibian company exports quality dates. Retrieved from https://neweralive.na/posts/namibian-company-exports-quality-dates

Namibia Meteorological Service (NMS). (2023). View the Namibia's long-term annual rainfall map [Online]. Available: http://www.meteona.com/index.php/climate/climate-publications/long-term-rainfall-map [2023, September 5].Prinsloo, H. (2021, 04). Komsberg has big plans for future. Retrieved from Namibian Sun: https://www.namibiansun.com/news/komsberg-has-big-plans-for-future2021-04-21

RN (1992). Agronomic Industry Act 20 of 1992. RN

RN (2004). Vision 2030, The Republic of Namibia. [Online]. Available: https://www.npc.gov.na/national-plans/vision-2030/ [2023, March 02].
RN (2021). Harambee Prosperity Plan II: 2021 – 2025, The Republic of Namibia [Online]. Available: http://hppii.gov.na/wp-content/uploads/2021/03/HPP2.pdf [2023, March 02].

Sartorius von Bach, H.J. & Kalundu, K.M. (2022). Are SACU countries self-sufficient in cereals? A dynamic panel analysis. Agrekon, 61(2), 151-166, DOI:10.1080/03031853.2022.2052124

TradeMap. (2023). International Trade Centre [Online]. Available: https://www.trademap.prg/ [2023, May 10].

Wanga, M.A., Shimelis, H., & Mengitsu, G. (2022). Sorghum production in northern Namibia: Farmers' perceived constraints and trait preferences. Sustainability, 14 (16).

World Bank. (2021). Container Port Performance Index [Online]. Available: https://thedocs.worldbank.org/en/doc/66e3aa5c3be4647addd01845ce353992-0190062022/original/Container-Port-Performance-Index2021.pdf#page=33&zoom=100,0,0 [2023, June 30].

APPENDIX A: PRIORITISATION OF CROPS PER PRODUCTION ZONE

Proposed priority crops per production zone - Grains

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - GRAINS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
Kavango	Rainfall	"The region with the most rainfall receiving +/-500mm annually. Bordered by the Kavango river."	White Maize	White Maize	"Well-drained loamy soils with a good mix of sand, silt, and clay are preferred. Prefers pH levels between 6.0 and 7.5. Generally requires 450mm to 600mm of water. Optimum temperature range is 20°C to 30°C. Sensitive to frost."	Suitable	High	6.28%
	Temperature	"Generally greater than 22°C in throughout the entire production region. Temperature range is between 5°C and 40°C annually, throughout the region. Summer: between 30 & 40°C. Winter: between 20 & 30°C. Subtropical Climate."	Wheat	Wheat	"Generally thrives in well-drained loamy soils. Loamy soils with good fertility and structure are preferred. Prefers pH levels between 6.0 and 7.5. Generally requires 400mm to 430mm of water. Optimum temperature range is 15°C to 24°C."	Suitable	Low	
	Likelihood of Frost Daylight Length	Moderate risk in winter months if temperatures go below 5°C. "11hrs20min on average in winter. 12hrs35min on average in summer."	Mahangu	Mahangu	"Performs well in sandy-loam to loamy soils with good drainage. Prefers pH levels between 6.0 and 7.5. Generally requires 300mm to 350mm of water. Optimum temperature range is 25°C to 35°C. Sensitive to frost."	Suitable	High	
	Soil Types	Low to moderate suitability for crop cultivation - mostly arenosols soils.	Sorghum	Sorghum	"Well-drained loamy soils are preferred. Prefers pH levels between 6.0 and 7.5. Generally requires between 450mm and 650mm of water. Optimum temperature range is 25°C to 35°C. Sensitive to frost."	Suitable	Low	
			Not currently produced	Sugarcane	"Generally prefers deep, well-drained soils of moderate fertility, characterized by sandy loam textures. Prefers pH levels between 6.0 and 7.7. Requires rainfall between 1100 mm and 1500mm. Prefers temperatures between 25°C and 35°C. Sensitive to frost."	Suitable	Low	
			Not currently produced	Rice	"Performs well in soils that are loam/clay type soils that retain water well. Prefers pH levels between 6.0 and 7.0. Optimal rainfall requirements depend on rice variety, stage of growth, and environmental conditions but generally ranges from 1000mm to 2500mm. Prefers temperatures between 20°C and 35°C.	Suitable	Low	

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - GRAINS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
Zambezi	Rainfall	"The region has relatively high levels of rainfall receiving +/- 500mm annually. The region is also bordered by the Zambezi River to the North and East."	Mahangu	Mahangu	"Performs well in sandy-loam to loamy soils with good drainage. Prefers pH levels between 6.0 and 7.5. Generally requires 300mm to 350mm of water. Optimum temperature range is 25°C to 35°C. Sensitive to frost."	Suitable	High	1.40%
	Temperature	"Generally greater than 22°C in throughout the entire production region. Temperature range is between 5°C and 40°C annually, throughout the region. Summer: between 30 & 40°C. Winter: between 20 & 30°C. Tropical Climate."	White Maize	White Maize	"Well-drained loamy soils with a good mix of sand, silt, and clay are preferred. Prefers pH levels between 6.0 and 7.5. Generally requires 450mm to 600mm of water. Optimum temperature range is 20°C to 30°C. Sensitive to frost."	Suitable	High	
	Likelihood of Frost	Moderate risk in winter months if temperatures go below 5°C.	Sorghum	Sorghum	"Well-drained loamy soils are preferred. Prefers pH levels between 6.0 and 7.5. Generally requires between 450mm and 650mm of water. Optimum temperature range is 25°C to 35°C. Sensitive to frost."	Suitable	Medium	
	Daylight Length	"11hrs25min on average in winter. 12hrs45min on average in summer."	Not currently produced	Wheat	"Generally thrives in well-drained loamy soils. Loamy soils with good fertility and structure are preferred. Prefers pH levels between 6.0 and 7.5. Generally requires 400mm to 430mm of water. Optimum temperature range is 15°C to 24°C."	Suitable	Low	
	Soil Types	"Moderate suitability for crop cultivation in western parts, low suitability to the eastern border. Arenosols and fluvisols in the western parts and cambisols to the eastern parts up to the border."	Not currently produced	Sugarcane	"Generally prefers deep, well-drained soils of moderate fertility, characterized by sandy loam textures. Prefers pH levels between 6.0 and 7.7. Requires rainfall between 1100 mm and 1500mm. Prefers temperatures between 25°C and 35°C. Sensitive to frost."	Suitable	High	
			Not currently produced	Rice	"Performs well in soils that are loam/clay type soils that retain water well. Prefers pH levels between 6.0 and 7.0. Optimal rainfall requirements depend on rice variety, stage of growth, and environmental conditions but generally ranges from 1000mm to 2500mm. Prefers temperatures between 20°C and 35°C. Sensitive to frost."	Suitable	High	

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - GRAINS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
Karst	Rainfall	"Ranges between 400 and 500mm annually - more rainfall in central parts, and less (between 300mm and 400mm) in the south-eastern parts."	Wheat	Wheat	"Generally thrives in well-drained loamy soils. Loamy soils with good fertility and structure are preferred. Prefers pH levels between 6.0 and 7.5. Generally requires 400mm to 430mm of water. Optimum temperature range is 15°C to 24°C."	Suitable	High	9.75%
	Temperature	"Generally greater than 22°C in northern parts then reduces to roughly 20°C in the south eastern parts. Temperature range is generally between 5°C and 35°C annually. Summer: often above 35 & 40°C. Winter: between 20 & 30°C."	White Maize	White Maize	"Well-drained loamy soils with a good mix of sand, silt, and clay are preferred. Prefers pH levels between 6.0 and 7.5. Generally requires 450mm to 600mm of water. Optimum temperature range is 20°C to 30°C. Sensitive to frost."	Suitable	High	
	Likelihood of Frost	Moderate risk in winter months if temperatures go below 5°C.	Mahangu	Mahangu	"Performs well in sandy-loam to loamy soils with good drainage. Prefers pH levels between 6.0 and 7.5. Generally requires 300mm to 350mm of water. Optimum temperature range is 25°C to 35°C. Sensitive to frost."	Suitable	High	
	Daylight Length	"11hrs25min on average in winter. 12hrs50min on average in summer."						
	Soil Types	Mostly comprised of leptosols with more arenosols towards the eastern parts of the region.						

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - GRAINS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
North Central	Rainfall	"Ranges between 100 and 400mm annually - more rainfall in eastern parts. Less than 100mm along the coast annually."	Not currently produced	Wheat	"Generally thrives in well-drained loamy soils. Loamy soils with good fertility and structure are preferred. Prefers pH levels between 6.0 and 7.5. Generally requires 400mm to 430mm of water. Optimum temperature range is 15°C to 24°C."	Suitable	Low	3.96%
	Temperature	"Generally greater than 22°C in eastern parts and on Northern border. Ranges between 20°C and 22°C in central parts. Ranges between 17°C and 21°C from the coast towards the east. Temperature range is between 5°C and 40°C annually. Summer: between 30 & 40°C. Winter: between 20 & 30°C."	White Maize	White Maize	"Well-drained loamy soils with a good mix of sand, silt, and clay are preferred. Prefers pH levels between 6.0 and 7.5. Generally requires 450mm to 600mm of water. Optimum temperature range is 20°C to 30°C. Sensitive to frost."	Suitable	High	
	Likelihood of Frost	Moderate risk in winter months if temperatures go below 5°C.	Mahangu	Mahangu	"Performs well in sandy-loam to loamy soils with good drainage. Prefers pH levels between 6.0 and 7.5. Generally requires 300mm to 350mm of water. Optimum temperature range is 25°C to 35°C. Sensitive to frost."	Suitable	High	
	Daylight Length	"11hrs20min on average in winter. 12hrs30min on average in summer."	Sorghum	Sorghum	"Well-drained loamy soils are preferred. Prefers pH levels between 6.0 and 7.5. Generally requires between 450mm and 650mm of water. Optimum temperature range is 25°C to 35°C. Sensitive to frost."	Suitable	Medium	
	Soil Types	"Rock outcrops in north-west parts. Cambisols soils along parts of Northern border. Calcisol soils in a small area on the Northern border. Arenosols mostly run South of the cambisol and calcisol areas. Leptosols in southern parts."	Rice	Rice	"Performs well in soils that are loam/clay type soils that retain water well. Prefers pH levels between 6.0 and 7.0. Optimal rainfall requirements depend on rice variety, stage of growth, and environmental conditions but generally ranges from 1000mm to 2500mm. Prefers temperatures between 20°C and 35°C. Sensitive to frost."	Suitable	High	

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - GRAINS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
Central	Rainfall	"Ranges mostly between 200mm and 400mm annually in most parts. Can be more +/- 400mm annually in an area north of Windhoek. Less than 100mm annually along the coast."	White Maize	White Maize	"Well-drained loamy soils with a good mix of sand, silt, and clay are preferred. Prefers pH levels between 6.0 and 7.5. Generally requires 450mm to 600mm of water during the growing season. Optimum temperature range is 20°C to 30°C. Sensitive to frost."	Suitable	High	3.35%
	Temperature	"<16°C to 18°C on average along the coast and increases inland. Central parts range between 20°C and >22°C on average. Eastern parts generally between 19°C and 20°C. Temperature range is between 0°C and 45°C annually. Summer: between 30 & 40°C. Winter: between 20 & 30°C."	Wheat	Wheat	"Generally thrives in well-drained loamy soils. Loamy soils with good fertility and structure are preferred. Prefers pH levels between 6.0 and 7.5. Generally requires 400mm to 430mm of water during the growing season. Optimum temperature range is 15°C to 24°C."	Suitable	High	
	Likelihood of Frost	Likely in winter when temperatures go to 0°C and below.	Mahangu	Mahangu	"Performs well in sandy-loam to loamy soils with good drainage. Prefers pH levels between 6.0 and 7.5. Generally requires 300mm to 350mm of water. Optimum temperature range is 25°C to 35°C. Sensitive to frost."	Suitable	Medium	
	Daylight Length	"12hrs45min on average in summer. 11hrs05min on average in winter."						
	Soil Types	"Western parts contain gypsisols, calcisols, regosols. Some rock outcrops on western border. Central parts contain regosols, cambisols, leptosols and arenosols. Eastern parts dominated by arenosols with low crop suitability."						

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - GRAINS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
South	Rainfall	"Less than 100mm along the coast, increases towards the east. From roughly the region's centre towards the eastern border, rainfall is between 100mm and 200mm annually. +/-200mm in northeastern parts."	White Maize	White Maize	"Well-drained loamy soils with a good mix of sand, silt, and clay are preferred. Prefers pH levels between 6.0 and 7.5. Generally requires 450mm to 600mm of water during the growing season. Optimum temperature range is 20°C to 30°C. Sensitive to frost."	Suitable	High	1.71%
	Temperature	"Ranges between <16°C and 20°C on average, warming gradually towards the east. From the central part of the region the average annual temperature ranges between 20°C and 22°C. Temperature range is generally between 5°C and 40°C. Summer: between 30 & 40°C. Winter: between 20 & 30°C."	Wheat	Wheat	"Generally thrives in well-drained loamy soils. Loamy soils with good fertility and structure are preferred. Prefers pH levels between 6.0 and 7.5. Generally requires 400mm to 430mm of water during the growing season. Optimum temperature range is 15°C to 24°C."	Suitable	High	
	Likelihood of Frost	Moderate risk in winter months if temperatures go below 5°C.						
	Daylight Length	"11hrs00min on average in winter. 13hrs05min on average in summer."						
	Soil Types	Mostly low suitability for crop production. Centre of the region is mostly Leptosols, East of the region is mostly arenosols, and the west of region is mostly dune sand						

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - GRAINS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
Orange River	Rainfall	"Rainfall is less than 100mm along the coast and into the central parts. From roughly the centre of the region towards the eastern border, rainfall is +/- 100mm annually."	N/A	N/A	N/A	N/A	N/A	N/A
	Temperature	"Ranges between <16°C and 20°C on average, warming gradually towards the east. From the central part of the region the average annual temperature ranges between 20°C and 22°C. Temperature range is generally between 5°C and 40°C. Summer: between 30 & 40°C. Winter: between 20 & 30°C."						
	Likelihood of Frost	Moderate risk in winter months if temperatures go below 5°C.						
	Daylight Length	"11hrs00min on average in winter. 13hrs12min on average in summer."						
	Soil Types	"Western parts contain mostly fluvisols with some regosols and leptosols. Central parts mostly leptosols with some regosols. Eastern parts mostly leptosols. Arenosols and rock outcrops on eastern boundary."						

APPENDIX A: PRIORITISATION OF CROPS PER PRODUCTION ZONE

Proposed priority crops per production zone – Oilseeds

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - OILSEEDS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
Kavango	Rainfall	"The region with the most rainfall receiving +/-500mm annually. Bordered by the Kavango river."	Not currently produced	Canola	"Prefers clay-loam soils in which soil crusting is not a problem and is not susceptible to wind erosion. Cool weather conditions with an optimum temperature for growth and production of 21 °C. At least 300 mm of rainfall for a yield of 2 t/ha."	Suitable	Low	0.97%
	Temperature	"Generally greater than 22°C in throughout the entire production region. Temperature range is between 5°C and 40°C annually, throughout the region. Summer: between 30 & 40°C. Winter: between 20 & 30°C. Subtropical Climate."	Not currently produced	Sesame	"Prefers soil pH levels of 5.4 to 6.7. Sesame grows best on well-drained soils of moderate fertility. Optimum temperature for growth varies with cultivar in the range 27–35°C. Base temperature for germination is about 16°C."	Suitable	Medium	
	Likelihood of Frost	Moderate risk in winter months if temperatures go below 5°C.	Not currently produced	Soybeans	"Well suited to heavier soils Soybean like fertile soils which are deep and well drained. Yields are negatively affected where temperatures rise above 30°C. Ideal rainfall averages between 500 mm to 900 mm."	Suitable	Low	
	Daylight Length	"11hrs20min on average in winter. 12hrs35min on average in summer."						
	Soil Types	Low to moderate suitability for crop cultivation - mostly arenosols soils.	Sunflower	Sunflower	"Tolerant of clay loam or silty clay loam soils, and perform well on sandy loam soils. Ideal pH range of 6.0 to 6.8. Water requirements between 500mm and 670mm. Growth generally in warm climates depending on cultivar."	Suitable	High	

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - OILSEEDS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
Zambezi	Rainfall	"The region has relatively high levels of rainfall receiving +/- 500mm annually. The region is also bordered by the Zambezi River to the North and East."	Not currently produced	Olives	"Prefers soils with both medium acid and medium alkaline pH, but pH values greater than 8.5 reduce growth significantly. Do not survive in temperatures lower than -12°C, but require a period of low temperatures (0-7°C) for flowering and differentiation."	Suitable	Medium	0.11%
	Temperature	"Generally greater than 22°C in throughout the entire production region. Temperature range is between 5°C and 40°C annually, throughout the region. Summer: between 30 & 40°C. Winter: between 20 & 30°C. Tropical Climate."	Not currently produced	Canola	"Prefers clay-loam soils in which soil crusting is not a problem and is not susceptible to wind erosion. Cool weather conditions with an optimum temperature for growth and production of 21 °C. At least 300 mm of rainfall for a yield of 2 t/ha."	Suitable	Low	
	Likelihood of Frost	Moderate risk in winter months if temperatures go below 5°C.	Not currently produced	Sesame	"Prefers soil pH levels of 5.4 to 6.7. Sesame grows best on well-drained soils of moderate fertility. Optimum temperature for growth varies with cultivar in the range 27–35°C. Base temperature for germination is about 16°C."	Suitable	Low	
	Daylight Length	"11hrs25min on average in winter. 12hrs45min on average in summer."	Not currently produced	Soybeans	"Well suited to heavier soils Soybean like fertile soils which are deep and well drained. Yields are negatively affected where temperatures rise above 30°C. Ideal rainfall averages between 500 mm to 900 mm."	Suitable	Medium	
	Soil Types	"Moderate suitability for crop cultivation in western parts, low suitability to the eastern border. Arenosols and fluvisols in the western parts and cambisols to the eastern parts up to the border."	Not currently produced	Sunflower	"Tolerant of clay loam or silty clay loam soils, and perform well on sandy loam soils. Ideal pH range of 6.0 to 6.8. Water requirements between 500mm and 670mm. Growth generally in warm climates depending on cultivar."	Suitable	Medium	

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - OILSEEDS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
Karst	Rainfall	"Ranges between 400 and 500mm annually - more rainfall in central parts, and less (between 300mm and 400mm) in the south-eastern parts."	Not currently produced	Olives	"Prefers soils with both medium acid and medium alkaline pH, but pH values greater than 8.5 reduce growth significantly. Do not survive in temperatures lower than -12°C, but require a period of low temperatures (0-7°C) for flowering and differentiation."	Suitable	Low	0.38%
	Temperature	"Generally greater than 22°C in northern parts then reduces to roughly 20°C in the south eastern parts. Temperature range is generally between 5°C and 35°C annually. Summer: often above 35 & 40°C. Winter: between 20 & 30°C."	Not currently produced	Canola	"Prefers clay-loam soils in which soil crusting is not a problem and is not susceptible to wind erosion. Cool weather conditions with an optimum temperature for growth and production of 21 °C. At least 300 mm of rainfall for a yield of 2 t/ha."	Suitable	High	
	Likelihood of Frost	Moderate risk in winter months if temperatures go below 5°C.	Not currently produced	Sesame	"Prefers soil pH levels of 5.4 to 6.7. Sesame grows best on well-drained soils of moderate fertility. Optimum temperature for growth varies with cultivar in the range 27–35°C. Base temperature for germination is about 16°C."	Suitable	Low	
	Daylight Length	"11hrs25min on average in winter. 12hrs50min on average in summer."	Not currently produced	Soybeans	"Well suited to heavier soils Soybean like fertile soils which are deep and well drained. Yields are negatively affected where temperatures rise above 30°C. Ideal rainfall averages between 500 mm to 900 mm."	Suitable	Medium	
	Soil Types	Mostly comprised of leptosols with more arenosols towards the eastern parts of the region.						

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - OILSEEDS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
North Central	Rainfall	"Ranges between 100 and 400mm annually - more rainfall in eastern parts. Less than 100mm along the coast annually."	Not currently produced	Canola	"Prefers clay-loam soils in which soil crusting is not a problem and is not susceptible to wind erosion. Cool weather conditions with an optimum temperature for growth and production of 21 °C. At least 300 mm of rainfall for a yield of 2 t/ha."	Suitable	Low	0.27%
	Temperature	"Generally greater than 22°C in eastern parts and on Northern border. Ranges between 20°C and 22°C in central parts. Ranges between 17°C and 21°C from the coast towards the east. Temperature range is between 5°C and 40°C annually. Summer: between 30 & 40°C. Winter: between 20 & 30°C."	Not currently produced	Sesame	"Prefers soil pH levels of 5.4 to 6.7. Sesame grows best on well-drained soils of moderate fertility. Optimum temperature for growth varies with cultivar in the range 27–35°C. Base temperature for germination is about 16°C."	Suitable	Medium	
	Likelihood of Frost	Moderate risk in winter months if temperatures go below 5°C.	Not currently produced	Soybeans	"Well suited to heavier soils Soybean like fertile soils which are deep and well drained. Yields are negatively affected where temperatures rise above 30°C. Ideal rainfall averages between 500 mm to 900 mm."	Suitable	Low	
	Daylight Length	"11hrs20min on average in winter. 12hrs30min on average in summer."						
	Soil Types	"Rock outcrops in north-west parts. Cambisol soils along parts of Northern border. Calcisol soils in a small area on the Northern border. Arenosols mostly run South of the cambisol and calcisol areas. Leptosols in southern parts."						

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - OILSEEDS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
Central	Rainfall	"Ranges mostly between 200mm and 400mm annually in most parts. Can be more +/- 400mm annually in an area north of Windhoek. Less than 100mm annually along the coast."	Olives	Olives	"Prefers soils with both medium acid and medium alkaline pH, but pH values greater than 8.5 reduce growth significantly. Do not survive in temperatures lower than -12°C, but require a period of low temperatures (0-7°C) for flowering and differentiation."	Suitable	High	0.75%
	Temperature	"<16°C to 18°C on average along the coast and increases inland. Central parts range between 20°C and >22°C on average. Eastern parts generally between 19°C and 20°C. Temperature range is between 0°C and 45°C annually. Summer: between 30 & 40°C. Winter: between 20 & 30°C."	Not currently produced	Canola	"Prefers clay-loam soils in which soil crusting is not a problem and is not susceptible to wind erosion. Cool weather conditions with an optimum temperature for growth and production of 21 °C. At least 300 mm of rainfall for a yield of 2 t/ha."	Suitable	High	
	Likelihood of Frost	Likely in winter when temperatures go to 0°C and below.	Not currently produced	Sesame	"Prefers soil pH levels of 5.4 to 6.7. Sesame grows best on well-drained soils of moderate fertility. Optimum temperature for growth varies with cultivar in the range 27–35°C. Base temperature for germination is about 16°C."	Suitable	Low	
	Daylight Length	"12hrs45min on average in summer. 11hrs05min on average in winter."	Not currently produced	Soybeans	"Well suited to heavier soils Soybean like fertile soils which are deep and well drained. Yields are negatively affected where temperatures rise above 30°C. Ideal rainfall averages between 500 mm to 900 mm."	Suitable	Medium	
	Soil Types	"Western parts contain gypsisols, calcisols, regosols. Some rock outcrops on western border. Central parts contain regosols, cambisols, leptosols and arenosols. Eastern parts dominated by arenosols with low crop suitability."						

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - OILSEEDS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
South	Rainfall	"Less than 100mm along the coast, increases towards the east. From roughly the region's centre towards the eastern border, rainfall is between 100mm and 200mm annually. +/-200mm in northeastern parts."	Olives	Olives	"Prefers soils with both medium acid and medium alkaline pH, but pH values greater than 8.5 reduce growth significantly. Do not survive in temperatures lower than -12°C, but require a period of low temperatures (0-7°C) for flowering and differentiation."	Suitable	Medium	0.27%
	Temperature	"Ranges between <16°C and 20°C on average, warming gradually towards the east. From the central part of the region the average annual temperature ranges between 20°C and 22°C. Temperature range is generally between 5°C and 40°C. Summer: between 30 & 40°C. Winter: between 20 & 30°C."	Not currently produced	Canola	"Prefers clay-loam soils in which soil crusting is not a problem and is not susceptible to wind erosion. Cool weather conditions with an optimum temperature for growth and production of 21 °C. At least 300 mm of rainfall for a yield of 2 t/ha."	Suitable	High	
	Likelihood of Frost	Moderate risk in winter months if temperatures go below 5°C.	Not currently produced	Sesame	"Prefers soil pH levels of 5.4 to 6.7. Sesame grows best on well-drained soils of moderate fertility. Optimum temperature for growth varies with cultivar in the range 27–35°C. Base temperature for germination is about 16°C."	Suitable	Low	
	Daylight Length	"11hrs00min on average in winter. 13hrs05min on average in summer."						
	Soil Types	Mostly low suitability for crop production. Centre of the region is mostly Leptosols, East of the region is mostly arenosols, and the west of region is mostly dune sand						

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - OILSEEDS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
Orange River	Rainfall	"Rainfall is less than 100mm along the coast and into the central parts. From roughly the centre of the region towards the eastern border, rainfall is +/- 100mm annually."	N/A	N/A	N/A	N/A	N/A	0.16%
	Temperature	"Ranges between <16°C and 20°C in average, warming gradually towards the east. From the central part of the region the average annual temperature ranges between 20°C and 22°C. Temperature range is generally between 5°C and 35°C. Summer: between 30 & 40°C. Winter: between 20 & 30°C."						
	Likelihood of Frost	Moderate risk in winter months if temperatures go below 5°C.						
	Daylight Length	"11hrs00min on average in winter. 13hrs12min on average in summer."						
	Soil Types	"Western parts contain mostly fluvisols with some regosols and leptosols. Central parts mostly leptosols with some regosols. Eastern parts mostly leptosols. Arenosols and rock outcrops on eastern boundary."						

APPENDIX A: PRIORITISATION OF CROPS PER PRODUCTION ZONE

Proposed priority crops per production zone – Legumes and nuts

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - LEGUMES & NUTS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY
			Current Production	Potential crops			
Kavango	Rainfall	"The region with the most rainfall receiving +/-500mm annually. Bordered by the Kavango river."	Not currently produced	Cashew	"Performs well in sandy-loam to loamy soils with good drainage. Prefers pH levels between 4.5 and 6.5. Generally requires 500mm to 1200mm of water. Optimum temperature mean is 27°C."	Suitable	Medium
	Temeperature	"Generally greater than 22°C in throughout the entire production region. Temaprature range is between 5°C and 40°C annually, throughout the region. Summer: between 30 & 40°C. Winter: between 20 & 30°C. Subtropical Climate."	Beans (all types)	Beans (all types)	"Deep well-drained homogenous medium loam soils. Prefers pH levels between 6.0 and 6.5. Generally requires 650mm to 750mm of water during the growing season. Optimim temperature range is 16°C to 24°C. Sensitive to frost."	Suitable	High
	Likelihood of Frost	Moderate risk in winter months if temperatures go below 5°C.	Groundnuts	Groundnuts	"Deep structurless sandy to sandy loam soils. Prefers pH levels of 5.3 to 7.0. Generally requires between 250mm to 1000mm depending on the variety. Optimim temperature range is 25°C to 30°C."	Suitable	High
	Daylight Length	"11hrs20min on average in winter. 12hrs35min on average in summer."					
	Soil Types	Low to moderate suitability for crop cultivation - mostly arenosols soils.	Not currently produced	Pecan	"Performs well in fertile well drained deep soils with loose to medium texture. Prefers pH levels of 6.0 to 7.0. Pecan trees require roughly 1000L of water annually. Optimum temperature range is 23°C to 28°C. "	Suitable	Low
			Not currently produced	Macadamia	"Deep well drained soils. Prefers pH levels between 5 to 6.5. Generally requires 800mm to 1200mm of water during the growing season. Optimim temperature range is 16°C to 25°C."	Suitable	Medium

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - LEGUMES & NUTS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY
			Current Production	Potential crops			
Zambezi	Rainfall	"The region has relatively high levels of rainfall receiving +/-500mm annually. The region is also bordered by the Zambezi River to the North and East."	Not currently produced	Cashew	"Performs well in sandy-loam to loamy soils with good drainage. Prefers pH levels between 4.5 and 6.5. Generally requires 500mm to 1200mm of water. Optimum temperature mean is 27°C."	Suitable	Medium
	Temeperature	"Generally greater than 22°C in throughout the entire production region. Temaprature range is between 5°C and 40°C annually, throughout the region. Summer: between 30 & 40°C. Winter: between 20 & 30°C. Tropical Climate."	Beans (all types)	Beans (all types)	"Deep well-drained homogenous medium loam soils. Prefers pH levels between 6.0 and 6.5. Generally requires 650mm to 750mm of water during the growing season. Optimim temperature range is 16°C to 24°C. Sensitive to frost."	Suitable	High
	Likelihood of Frost	Moderate risk in winter months if temperatures go below 5°C.	Groundnuts	Groundnuts	"Deep structurless sandy to sandy loam soils. Prefers pH levels of 5.3 to 7.0. Generally requires between 250mm to 1000mm depending on the variety. Optimim temperature range is 25°C to 30°C."	Suitable	Medium
	Daylight Length	"11hrs25min on average in winter. 12hrs45min on average in summer."	Not currently produced	Pecan	"Performs well in fertile well drained deep soils with loose to medium texture. Prefers pH levels of 6.0 to 7.0. Pecan trees require roughly 1000L of water annually. Optimum temperature range is 23°C to 28°C."	Suitable	Low
	Soil Types	"Moderate suitability for crop cultivation in western parts, low suitability to the eastern border. Arenosols and fluvisols in the western parts and cambisols to the eastern parts up to the border."	Not currently produced	Macadamia	"Deep well drained soils. Prefers pH levels between 5 to 6.5. Generally requires 800mm to 1200mm of water during the growing season. Optimim temperature range is 16°C to 25°C."	Suitable	Medium

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - LEGUMES & NUTS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY
			Current Production	Potential crops			
Karst	Rainfall	"Ranges between 400 and 500mm annually - more rainfall in central parts, and less (between 300mm and 400mm) in the south-eastern parts."	Not currently produced	Cashew	"Performs well in sandy-loam to loamy soils with good drainage. Prefers pH levels between 4.5 and 6.5. Generally requires 500mm to 1200mm of water. Optimum temperature mean is 27°C."	Suitable	Medium
	Temeperature	"Generally greater than 22°C in nprthern parts then reduces to roughly 20°C in the south eastern parts. Temaprature range is generally between 5°C and 35°C annually. Summer: often above 35 & 40°C. Winter: between 20 & 30°C."	Beans (all types)	Beans (all types)	"Deep well-drained homogenous medium loam soils. Prefers pH levels between 6.0 and 6.5. Generally requires 650mm to 750mm of water during the growing season. Optimim temperature range is 16°C to 24°C. Sensitive to frost."	Suitable	High
	Likelihood of Frost	Moderate risk in winter months if temperatures go below 5°C.	Not currently produced	Groundnuts	"Deep structurless sandy to sandy loam soils. Prefers pH levels of 5.3 to 7.0. Generally requires between 250mm to 1000mm depending on the variety. Optimim temperature range is 25°C to 30°C."	Suitable	Medium
	Daylight Length	"11hrs25min on average in winter. 12hrs50min on average in summer."	Pecan	Pecan	"Performs well in fertile well drained deep soils with loose to medium texture. Prefers pH levels of 6.0 to 7.0. Pecan trees require roughly 1000L of water annually. Optimum temperature range is 23°C to 28°C. "	Suitable	Low
	Soil Types	Mostly comprised of leptosols with more arenosols towards the eastern parts of the region.	Not currently produced	Macadamia	"Deep well drained soils. Prefers pH levels between 5 to 6.5. Generally requires 800mm to 1200mm of water during the growing season. Optimim temperature range is 16°C to 25°C."	Suitable	Medium

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - LEGUMES & NUTS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY
			Current Production	Potential crops			
North Central	Rainfall	"Ranges between 100 and 400mm annually - more rainfall in eastern parts. Less than 100mm along the coast annually."	Cashew	Cashew	"Performs well in sandy-loam to loamy soils with good drainage. Prefers pH levels between 4.5 and 6.5. Generally requires 500mm to 1200mm of water. Optimum temperature mean is 27°C."	Suitable	Medium
	Temeperature	"Generally greater than 22°C in eastern parts and on Northern border. Ranges between 20°C and 22°C in central parts. Ranges between 17°C and 21°C from the coast towards the east. Temaprature range is between 5°C and 40°C annually. Summer: between 30 & 40°C. Winter: between 20 & 30°C."	Not currently produced	Beans (all types)	"Deep well-drained homogenous medium loam soils. Prefers pH levels between 6.0 and 6.5. Generally requires 650mm to 750mm of water during the growing season. Optimim temperature range is 16°C to 24°C. Sensitive to frost."	Suitable	High
	Likelihood of Frost	Moderate risk in winter months if temperatures go below 5°C.	Not currently produced	Groundnuts	"Deep structurless sandy to sandy loam soils. Prefers pH levels of 5.3 to 7.0. Generally requires between 250mm to 1000mm depending on the variety. Optimim temperature range is 25°C to 30°C."	Suitable	Medium
	Daylight Length	"11hrs20min on average in winter. 12hrs30min on average in summer."	Not currently produced	Pecan	"Performs well in fertile well drained deep soils with loose to medium texture. Prefers pH levels of 6.0 to 7.0. Pecan trees require roughly 1000L of water annually. Optimum temperature range is 23°C to 28°C. "	Suitable	Low
	Soil Types	"Rock outcrops in north-west parts. Cambisol soils along parts of Northern border. Calcisol soils in a small area on the Northern border. Arenosols mostly run South of the cambisol and calcisol areas. Leptosols in southern parts."	Not currently produced	Macadamia	"Deep well drained soils. Prefers pH levels between 5 to 6.5. Generally requires 800mm to 1200mm of water during the growing season. Optimim temperature range is 16°C to 25°C."	Suitable	Medium

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - LEGUMES & NUTS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY
			Current Production	Potential crops			
Central	Rainfall	"Ranges mostly between 200mm and 400mm annually in most parts. Can be more +/- 400mm annually in an area north of Windhoek. Less than 100mm annually along the coast."	Beans (all types)	Beans (all types)	"Deep well-drained homogenous medium loam soils. Prefers pH levels between 6.0 and 6.5. Generally requires 650mm to 750mm of water during the growing season. Optimim temperature range is 16°C to 24°C. Sensitive to frost."	Suitable	High
	Temeperature	"<16°C to 18°C on average along the coast and increases inland. Central parts range between 20°C and >22°C on average. Eastern parts genrally between 19°C and 20°C. Temperature range is between 0°C and 45°C annually. Summer: between 30 & 40°C. Winter: between 20 & 30°C."	Groundnuts	Groundnuts	"Deep structurless sandy to sandy loam soils. Prefers pH levels of 5.3 to 7.0. Generally requires between 250mm to 1000mm depending on the variety. Optimim temperature range is 25°C to 30°C."	Suitable	High
			Not currently produced	Pecan	"Performs well in fertile well drained deep soils with loose to medium texture. Prefers pH levels of 6.0 to 7.0. Pecan trees require roughly 1000L of water annually. Optimum temperature range is 23°C to 28°C. "	Suitable	Medium
	Likelihood of Frost	Likley in winter when temperatures go to 0°C and below.	Not currently produced	Macadamia	"Deep well drained soils. Prefers pH levels between 5 to 6.5. Generally requires 800mm to 1200mm of water during the growing season. Optimim temperature range is 16°C to 25°C."	Suitable	Medium
	Daylight Length	"12hrs45min on average in summer. 11hrs05min on average in winter."					
	Soil Types	"Western parts contain gypsisols, calcisols, regosols. Some rock outcrops on western border. Central parts contain regosols, cambisols, leptosols and arenosols. Eastern parts dominated by arenosols with low crop suitability."	Not currently produced	Cashew	"Performs well in sandy-loam to loamy soils with good drainage. Prefers pH levels between 4.5 and 6.5. Generally requires 500mm to 1200mm of water. Optimum temperature mean is 27°C."	Suitable	Low

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - LEGUMES & NUTS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY
			Current Production	Potential crops			
South	Rainfall	"Less than 100mm along the coast, increases towards the east. From roughly the region's centre towards the eastern border, rainfall is between 100mm and 200mm annually. +/-200mm in northeastern parts."	N/A	N/A	N/A	N/A	N/A
	Temeperature	"Ranges between <16°C and 20°C on average, warming gradually towards the east. From the central part of the region the average annual temperature ranges between 20°C and 22°C. Temperature range is generally between 5°C and 40°C. Summer: between 30 & 40°C. Winter: between 20 & 30°C."					
	Likelihood of Frost	Moderate risk in winter months if temperatures go below 5°C.					
	Daylight Length	"11hrs00min on average in winter. 13hrs05min on average in summer."					
	Soil Types	Mostly low suitability for crop production. Centre of the region is mostly Leptosols, East of the region is mostly arenosols, and the west of region is mostly dune sand					

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - LEGUMES & NUTS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY
			Current Production	Potential crops			
Orange River	Rainfall	"Rainfall is less than 100mm along the coast and into the central parts. From roughly the centre of the region towards the eastern border, rainfall is +/- 100mm annually."	N/A	N/A	N/A	N/A	N/A
	Temeperature	"Ranges between <16°C and 20°C in average, warming gradually towards the east. From the central part of the region the average annual temperature ranges betwee 20°C and 22°C. Temperature range is generally between 5°C and 35°C. Summer: between 30 & 40°C. Winter: between 20 & 30°C"					
	Likelihood of Frost	Moderate risk in winter months if temperatures go below 5°C.					
	Daylight Length	"11hrs00min on average in winter. 13hrs12min on average in summer."					
	Soil Types	"Western parts contain mostly fluvisols with some regosols and leptosols. Central parts mostly leptosols with some regosols. Eastern parts mostly leptosols. Arenosols and rock outcrops on eastern boundary."					

APPENDIX A: PRIORITISATION OF CROPS PER PRODUCTION ZONE

Proposed priority crops per production zone – Fruits

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - FRUITS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
Kavango	Rainfall	"The region with the most rainfall receiving +/-500mm annually. Bordered by the Kavango river."	Not currently produced	Pine apple	"Grow best in moderately fertile, sandy loam soils. Grow satisfactorily in sandy and calcareous soils with attention to watering and fertilizer. Pineapple should be grown in well-drained soils and areas of the landscape that do not flood. Prefers a soil pH that is neutral to mildly acidic – 6.0 to 5.0. Optimum temperature range between 21°C and 29°C during the day and 15°C to 18°C at night. Prefers rainfall between 1000mm and 1500mm annually."	Suitable	Medium	6.68%
	Temeperature	"Generally greater than 22°C in throughout the entire production region. Temaprature range is between 5°C and 40°C annually, throughout the region. Summer: between 30 & 40°C. Winter: between 20 & 30°C. Subtropical Climate."						
	Likelihood of Frost	Moderate risk in winter months if temperatures go below 5°C.	Citrus fruits	Citrus fruits	"Can be grown in a wide range of soil types provided they are well drained, fertile, well-aerated soils. Prefers a soil pH level between 6.0 and 6.5. Minimum temperature should not go below 2°C with an optimum range between 12 and 45°C. Prefers rainfall between 1250mm and 1850mm annually."	Suitable	High	
	Daylight Length	"11hrs20min on average in winter. 12hrs35min on average in summer."						
	Soil Types	Low to moderate suitability for crop cultivation - mostly arenosols soils.	Mango	Mango	"Sandy-loam or loam soil (clay percent of 15-25%) is optimal under irrigation, soils with a clay content of up to 50% are also appropriate. pH levels between 4.5 and 7.0 are optimal. Can survive with less than 300mm of rainfall annually. Minimum temp. should be above 5°C and below 45°C. Very frost sensitive."	Suitable	High	
			Avocado	Avocado	"Prefer oose, loamy, or sandy with a slightly acidic to neutral pH, between 5 and 7. Prefer cool subtropical settings with a mean daily temperature of 20°C to 24°C (-4°C minimim). Annual rainfall exceeding 1000mm is desired. Frost sensitive."	Suitable	High	
			Banana	Banana	"Prefer loamy, sandy soils with a pH between 5.5 and 6.5. Prefers tropical climates with modest temperature changes. Optimum temperature for flower initiation is 22°C (negatively affected below 10°C). Requires between 900 and 1200mm of water. Sensitive to frost."	Suitable	High	

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - FRUITS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
Kavango			Blue berries	Berry fruits	"Prefer well-drained, sandy loam rich in organic matter and slightly acidic. Require between 25 and 25mm of water during their growing season (roughly six months). Prefers temperatures between 20°C and 30°C. Sensitive to frost."	Suitable	High	6.68%
			Not currently produced	Kiwi	"Prefer deep, rich, well-drained sandy loam soils with a soil pH slightly less than 6.9. Require between 800mm and 1000mm of water annually. Prefer a temperature range between 15°C and 35°C. Sensitive to frost."	Suitable	Medium	

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - FRUITS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
Zambezi	Rainfall	"The region has relatively high levels of rainfall receiving +/- 500mm annually. The region is also bordered by the Zambezi River to the North and East."	Pine apple		"Grow best in moderately fertile, sandy loam soils. Grow satisfactorily in sandy and calcareous soils with attention to watering and fertilizer. Pineapple should be grown in well-drained soils and areas of the landscape that do not flood. Prefers a soil pH that is neutral to mildly acidic – 6.0 to 5.0. Optimum temperature range between 21°C and 29°C during the day and 15°C to 18°C at night. Prefers rainfall between 1000mm and 1500mm annually."	Suitable	Medium	1.81%
	Temeperature	"Generally greater than 22°C in throughout the entire production region. Temaprature range is between 5°C and 40°C annually, throughout the region. Summer: between 30 & 40°C. Winter: between 20 & 30°C. Tropical Climate."	Citrus fruits	Citrus fruits	"Can be grown in a wide range of soil types provided they are well drained, fertile, well-aerated soils. Prefers a soil pH level between 6.0 and 6.5. Minimum temperature should not go below 2°C with an optimum range between 12 and 45°C. Prefers rainfall between 1250mm and 1850mm annually."	Suitable	High	
	Likelihood of Frost	Moderate risk in winter months if temperatures go below 5°C.						
	Daylight Length	"11hrs25min on average in winter. 12hrs45min on average in summer."	Mango	Mango	"Sandy-loam or loam soil (clay percent of 15-25%) is optimal under irrigation, soils with a clay content of up to 50% are also appropriate. pH levels between 4.5 and 7.0 are optimal. Can survive with less thatn 300mm of rainfall annually. Minimum temp. should be above 5°C and below 45°C. Very frost sensitive."	Suitable	High	
	Soil Types	"Moderate suitability for crop cultivation in western parts, low suitability to the eastern border. Arenosols and fluvisols in the western parts and cambisols to the eastern parts up to the border."						

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS	CROP PRODUCTION - FRUITS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
		Current Production	Potential crops				
Zambezi		Avocado	Avocado	"Prefer oose, loamy, or sandy with a slightly acidic to neutral pH, between 5 and 7. Prefer cool subtropical settings with a mean daily temperature of 20°C to 24°C (-4°C minimim). Annual rainfall exceeding 1000mm is desired. Frost sensitive."	Suitable	High	1.81%
		Banana	Banana	"Prefer loamy, sandy soils with a pH between 5.5 and 6.5. Prefers tropical climates with modest temperature changes. Optimum temperature for flower initiation is 22°C (negatively affected below 10°C). Requires between 900 and 1200mm of water. Sensitive to frost."	Suitable	High	
		Not currently produced	Berry fruits	"Prefer well-drained, sandy loam rich in organic matter and slightly acidic. Require between 25 and 25mm of water during their growing season (roughly six months). Prefers temperatures between 20°C and 30°C. Sensitive to frost."	Suitable	High	
		Not currently produced	Kiwi	"Prefer deep, rich, well-drained sandy loam soils with a soil pH slightly less than 6.9. Require between 800mm and 1000mm of water annually. Prefer a temperature range between 15°C and 35°C. Sensitive to frost."	Suitable	Medium	

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - FRUITS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
Karst	Rainfall	"Ranges between 400 and 500mm annually - more rainfall in central parts, and less (between 300mm and 400mm) in the south-eastern parts."	Not currently produced	Banana	"Prefer loamy, sandy soils with a pH between 5.5 and 6.5. Prefers tropical climates with modest temperature changes. Optimum temperature for flower initiation is 22°C (negatively affected below 10°C). Requires between 900 and 1200mm of water. Sensitive to frost."	Suitable	Low	4.52%
	Temeperature	"Generally greater than 22°C in nprthern parts then reduces to roughly 20°C in the south eastern parts. Temaprature range is generally between 5°C and 35°C annually. Summer: often above 35 & 40°C. Winter: between 20 & 30°C."	Not currently produced	Kiwi	"Prefer deep, rich, well-drained sandy loam soils with a soil pH slightly less than 6.9. Require between 800mm and 1000mm of water annually. Prefer a temperature range between 15°C and 35°C. Sensitive to frost."	Suitable	High	
	Likelihood of Frost	Moderate risk in winter months if temperatures go below 5°C.	Mango	Mango	"Sandy-loam or loam soil (clay percent of 15-25%) is optimal under irrigation, soils with a clay content of up to 50% are also appropriate. pH levels between 4.5 and 7.0 are optimal. Can survive with less thatn 300mm of rainfall annually. Minimum temp. should be above 5°C and below 45°C. Very frost sensitive."	Suitable	High	
	Daylight Length	"11hrs25min on average in winter. 12hrs50min on average in summer."	Citrus fruits	Citrus fruits	"Can be grown in a wide range of soil types provided they are well drained, fertile, well-aerated soils. Prefers a soil pH level between 6.0 and 6.5. Minimum temperature should not go below 2°C with an optimum range between 12 and 45°C. Prefers rainfall between 1250mm and 1850mm annually."	Suitable	High	
	Soil Types	Mostly comprised of leptosols with more arenosols towards the eastern parts of the region.	Berries	Berries	"Prefer well-drained, sandy loam rich in organic matter and slightly acidic. Require between 25 and 25mm of water during their growing season (roughly six months). Prefers temperatures between 20°C and 30°C. Sensitive to frost."	Suitable	Medium	

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - FRUITS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
North Central	Rainfall	"Ranges between 100 and 400mm annually - more rainfall in eastern parts. Less than 100mm along the coast annually."	Grapes	Grapes	"Require deep, well-drained soil with a minimum of 75 cm to 1 m of permeable soil with no impeding layers (shallow bedrock, chemical or physical hardpans). Prefers soil pH levels of 5.5 to 6.0. Prefer hot, dry climate (warm days, cool nights, low humidity). Water required depends on soil (range from 650 to 890mm)."	Suitable	Medium	2.71%
	Temeperature	"Generally greater than 22°C in eastern parts and on Northern border. Ranges between 20°C and 22°C in central parts. Ranges between 17°C and 21°C from the coast towards the east. Temaprature range is between 5°C and 40°C annually. Summer: between 30 & 40°C. Winter: between 20 & 30°C."	Not currently produced	Dates	"Prefer sandy loamy soils with good moisture retaining, aeration, and proper drainage. Prefers pH levels between 8.0 and 11.0. Prefer high temperatures (± 56°C). Prefer hot summers, low rainfall and humidity - especailly during ripening."	Suitable	Medium	
	Likelihood of Frost	Moderate risk in winter months if temperatures go below 5°C.	Citrus fruits	Citrus fruits	"Can be grown in a wide range of soil types provided they are well drained, fertile, well-aerated soils. Prefers a soil pH level between 6.0 and 6.5. Minimum temperature should not go below 2°C with an optimum range between 12 and 45°C. Prefers rainfall between 1250mm and 1850mm annually."	Suitable	Medium	
	Daylight Length	"11hrs20min on average in winter. 12hrs30min on average in summer."						
	Soil Types	"Rock outcrops in north-west parts. Cambisol soils along parts of Northern border. Calcisol soils in a small area on the Northern border. Arenosols mostly run South of the cambisol and calcisol areas. Leptosols in southern parts."	Mango	Mango	"Sandy-loam or loam soil (clay percent of 15-25%) is optimal under irrigation, soils with a clay content of up to 50% are also appropriate. pH levels between 4.5 and 7.0 are optimal. Can survive with less thatn 300mm of rainfall annually. Minimum temp. should be above 5°C and below 45°C. Very frost sensitive."	Suitable	Medium	
			Not currently produced	Avocado	"Prefer oose, loamy, or sandy with a slightly acidic to neutral pH, between 5 and 7. Prefer cool subtropical settings with a mean daily temperature of 20°C to 24°C (-4°C minimim). Annual rainfall exceeding 1000mm is desired. Frost sensitive."	Suitable	Medium	
			Banana	Banana	"Prefer loamy, sandy soils with a pH between 5.5 and 6.5. Prefers tropical climates with modest temperature changes. Optimum temperature for flower initiation is 22°C (negatively affected below 10°C). Requires between 900 and 1200mm of water. Sensitive to frost."	Suitable	Low	

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - FRUITS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
North Central			Berries	Berries	"Prefer well-drained, sandy loam rich in organic matter and slightly acidic. Require between 25 and 25mm of water during their growing season (roughly six months). Prefers temperatures between 20°C and 30°C. Sensitive to frost."	Suitable	High	2.71%
			Not currently produced	Kiwi	"Prefer deep, rich, well-drained sandy loam soils with a soil pH slightly less than 6.9. Require between 800mm and 1000mm of water annually. Prefer a temperature range between 15°C and 35°C. Sensitive to frost."	Suitable	Medium	

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - FRUITS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
Central	Rainfall	"Ranges mostly between 200mm and 400mm annually in most parts. Can be more +/- 400mm annually in an area north of Windhoek. Less than 100mm annually along the coast."	Grapes	Grapes	"Require deep, well-drained soil with a minimum of 75 cm to 1 m of permeable soil with no impeding layers (shallow bedrock, chemical or physical hardpans). Prefers soil pH levels of 5.5 to 6.0. Prefer hot, dry climate (warm days, cool nights, low humidity). Water required depends on soil (range from 650 to 890mm)."	Suitable	Low	0.90%
	Temeperature	"<16°C to 18°C on average along the coast and increases inland. Central parts range between 20°C and >22°C on average. Eastern parts genrally between 19°C and 20°C. Temperature range is between 0°C and 45°C annually. Summer: between 30 & 40°C. Winter: between 20 & 30°C."	Not currently produced	Dates	"Prefer sandy loamy soils with good moisture retaining, aeration, and proper drainage. Prefers pH levels between 8.0 and 11.0. Prefer high temperatures (± 56°C). Prefer hot summers, low rainfall and humidity - especailly during ripening."	Suitable	Low	
	Likelihood of Frost	Likley in winter when temperatures go to 0°C and below.	Citrus fruits	Citrus fruits	"Can be grown in a wide range of soil types provided they are well drained, fertile, well-aerated soils. Prefers a soil pH level between 6.0 and 6.5. Minimum temperature should not go below 2°C with an optimum range between 12 and 45°C. Prefers rainfall between 1250mm and 1850mm annually."	Suitable	High	
	Daylight Length	"12hrs45min on average in summer. 11hrs05min on average in winter."						
	Soil Types	"Western parts contain gypsisols, calcisols, regosols. Some rock outcrops on western border. Central parts contain regosols, cambisols, leptosols and arenosols. Eastern parts dominated by arenosols with low crop suitability."	Berries	Berries	"Prefer well-drained, sandy loam rich in organic matter and slightly acidic. Require between 25 and 25mm of water during their growing season (roughly six months). Prefers temperatures between 20°C and 30°C. Sensitive to frost."	Suitable	High	

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - FRUITS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
South	Rainfall	"Less than 100mm along the coast, increases towards the east. From roughly the region's centre towards the eastern border, rainfall is between 100mm and 200mm annually. +/-200mm in northeastern parts."	Grapes	Grapes	"Require deep, well-drained soil with a minimum of 75 cm to 1 m of permeable soil with no impeding layers (shallow bedrock, chemical or physical hardpans). Prefers soil pH levels of 5.5 to 6.0. Prefer hot, dry climate (warm days, cool nights, low humidity). Water required depends on soil (range from 650 to 890mm)."	Suitable	Medium	8.62%
	Temeperature	"Ranges between <16°C and 20°C on average, warming gradually towards the east. From the central part of the region the average annual temperature ranges between 20°C and 22°C. Temperature range is generally between 5°C and 40°C. Summer: between 30 & 40°C. Winter: between 20 & 30°C."	Dates	Dates	"Prefer sandy loamy soils with good moisture retaining, aeration, and proper drainage. Prefers pH levels between 8.0 and 11.0. Prefer high temperatures (± 56°C). Prefer hot summers, low rainfall and humidity - especailly during ripening."	Suitable	High	
	Likelihood of Frost	Moderate risk in winter months if temperatures go below 5°C.	Citrus fruits	Citrus fruits	"Can be grown in a wide range of soil types provided they are well drained, fertile, well-aerated soils. Prefers a soil pH level between 6.0 and 6.5. Minimum temperature should not go below 2°C with an optimum range between 12 and 45°C. Prefers rainfall between 1250mm and 1850mm annually."	Suitable	High	
	Daylight Length	"11hrs00min on average in winter. 13hrs05min on average in summer."	Mango	Mango	"Sandy-loam or loam soil (clay percent of 15-25%) is optimal under irrigation, soils with a clay content of up to 50% are also appropriate. pH levels between 4.5 and 7.0 are optimal. Can survive with less thatn 300mm of rainfall annually. Minimum temp. should be above 5°C and below 45°C. Very frost sensitive."	Suitable	Medium	
	Soil Types	Mostly low suitability for crop production. Centre of the region is mostly Leptosols, East of the region is mostly arenosols, and the west of region is mostly dune sand	Not currently produced	Avocado	"Prefer oose, loamy, or sandy with a slightly acidic to neutral pH, between 5 and 7. Prefer cool subtropical settings with a mean daily temperature of 20°C to 24°C (-4°C minimim). Annual rainfall exceeding 1000mm is desired. Frost sensitive."	Suitable	Medium	
			Berries	Berries	"Prefer well-drained, sandy loam rich in organic matter and slightly acidic. Require between 25 and 25mm of water during their growing season (roughly six months). Prefers temperatures between 20°C and 30°C. Sensitive to frost."	Suitable	High	

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - FRUITS		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
Orange River	Rainfall	"Rainfall is less than 100mm along the coast and into the central parts. From roughly the centre of the region towards the eastern border, rainfall is +/- 100mm annually."	Grapes	Grapes	"Require deep, well-drained soil with a minimum of 75 cm to 1 m of permeable soil with no impeding layers (shallow bedrock, chemical or physical hardpans). Prefers soil pH levels of 5.5 to 6.0. Prefer hot, dry climate (warm days, cool nights, low humidity). Water required depends on soil (range from 650 to 890mm)."	Suitable	High	13.42%
	Temeperature	"Ranges between <16°C and 20°C in average, warming gradually towards the east. From the central part of the region the average annual temperature ranges betwee 20°C and 22°C. Temperature range is generally between 5°C and 35°C. Summer: between 30 & 40°C. Winter: between 20 & 30°C"	Dates	Dates	"Prefer sandy loamy soils with good moisture retaining, aeration, and proper drainage. Prefers pH levels between 8.0 and 11.0. Prefer high temperatures (± 56°C). Prefer hot summers, low rainfall and humidity - especailly during ripening."	Suitable	High	
	Likelihood of Frost	Moderate risk in winter months if temperatures go below 5°C.	Mango	Mango	"Sandy-loam or loam soil (clay percent of 15-25%) is optimal under irrigation, soils with a clay content of up to 50% are also appropriate. pH levels between 4.5 and 7.0 are optimal. Can survive with less thatn 300mm of rainfall annually. Minimum temp. should be above 5°C and below 45°C. Very frost sensitive."	Suitable	Medium	
	Daylight Length	"11hrs00min on average in winter. 13hrs12min on average in summer."	Citrus fruits	Citrus fruits	"Can be grown in a wide range of soil types provided they are well drained, fertile, well-aerated soils. Prefers a soil pH level between 6.0 and 6.5. Minimum temperature should not go below 2°C with an optimum range between 12 and 45°C. Prefers rainfall between 1250mm and 1850mm annually."	Suitable	High	
	Soil Types	"Western parts contain mostly fluvisols with some regosols and leptosols. Central parts mostly leptosols with some regosols. Eastern parts mostly leptosols. Arenosols and rock outcrops on eastern boundary."	Berries	Berries	"Prefer well-drained, sandy loam rich in organic matter and slightly acidic. Require between 25 and 25mm of water during their growing season (roughly six months). Prefers temperatures between 20°C and 30°C. Sensitive to frost."	Suitable	High	

APPENDIX A: PRIORITISATION OF CROPS PER PRODUCTION ZONE

Proposed priority crops per production zone – Vegetables

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - VEGETABLES		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
Kavango	Rainfall	"The region with the most rainfall receiving +/-500mm annually. Bordered by the Kavango river."	Potato	Potato	"Suitbale for a variety of soils, but best results are obtained from light soils that have good drainage and depth. Require good supply of moisture (800 -1200mm/ year). Require cool growing conditions (average temperature 7°C -20°C)."	Suitable	High	3.46%
	Temperature	"Generally greater than 22°C in throughout the entire production region. Temaprature range is between 5°C and 40°C annually, throughout the region. Summer: between 30 & 40°C. Winter: between 20 & 30°C. Subtropical Climate."	Onion	Onion	"Can be grown successfully in most soils. Prefer cool conditions in early months between 12 and 24 °C. Daily means of 25°C to 27 °C - accelerate the bulbing process and are preferred from the start of bulbing. Generally require between 500mm and 700mm of water."	Suitable	High	
	Likelihood of Frost	Moderate risk in winter months if temperatures go below 5°C.	Tomato	Tomato	"Prefers sandy loam to clay loam soils, with a clay content of between 15 and 35%. Require a temperature range between 10 and 34°C. Optimum temperature range bewteen 26 and 29°C. Prefer fertile, humus-rich, free-draining, moisture-retentive soils."	Suitable	High	
	Daylight Length	"11hrs20min on average in winter. 12hrs35min on average in summer."	Butternuts	Butternuts	"Generally thrives in well-drained soils with low salt levels and high organic matter. Loamy soils with good fertility and structure are preferred. Prefers pH levels between 6.0 and 6.5. Generally requires 25mm to 40mm of water per week. Optimim temperature range is 18°C to 24°C."	Suitable	High	
	Soil Types	Low to moderate suitability for crop cultivation - mostly arenosols soils.	Not a major crop	Sweet pepper	"Well-drained to a depth of at least 600mm. Sandy to loam soils with a high level of soil fertility. Prefers pH levels between 5.5 and 7.0, but is variety dependent. Generally requires 400mm to 550mm of water. Daytime temperature range of 2 to 28°C, night of 16 to 18°C. Sensitive to frost."	Suitable	High	

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - VEGETABLES		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
			Not a major crop	Lettuce	"Performs well fertile loam soils with high organic matter. Prefers pH levels between 6.0 and 6.8. Generally requires 25mm of water per week but can double dependant on climate. Optimum temperature range is 15°C to 20°C. Sensitive to frost."	Suitable	Low	3.46%
			Sweet potato	Sweet potato	"Performs best in light sandy loam soils. Prefers pH levels around 6.0. Generally requires at least 400mm of water. Optimum temperature range is 21°C to 29°C. Sensitive to frost."	Suitable	High	

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - VEGETABLES		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
Zambezi	Rainfall Temperature	"The region has relatively high levels of rainfall receiving +/-500mm annually. The region is also bordered by the Zambezi River to the North and East."	Potato	Potato	"Suitbale for a variety of soils, but best results are obtained from light soils that have good drainage and depth. Require good supply of moisture (800 -1200mm/ year). Require cool growing conditions (average temperature 7°C -20°C)."	Suitable	High	1.57%
	Likelihood of Frost Daylight Length Soil Types	"Generally greater than 22°C in throughout the entire production region. Temaprature range is between 5°C and 40°C annually, throughout the region. Summer: between 30 & 40°C. Winter: between 20 & 30°C. Tropical Climate."	Onion	Onion	"Can be grown successfully in most soils. Prefer cool conditions in early months between 12 and 24 °C. Daily means of 25°C to 27 °C - accelerate the bulbing process and are preferred from the start of bulbing. Generally require between 500mm and 700mm of water."	Suitable	High	
		Moderate risk in winter months if temperatures go below 5°C.	Tomato	Tomato	"Prefers sandy loam to clay loam soils, with a clay content of between 15 and 35%. Require a temperature range between 10 and 34°C. Optimum temperature range bewteen 26 and 29°C. Prefer fertile, humus-rich, free-draining, moisture-retentive soils."	Suitable	High	
		"11hrs25min on average in winter. 12hrs45min on average in summer."	Butternuts	Butternuts	"Generally thrives in well-drained soils with low salt levels and high organic matter. Loamy soils with good fertility and structure are preferred. Prefers pH levels between 6.0 and 6.5. Generally requires 25mm to 40mm of water per week. Optimim temperature range is 18°C to 24°C."	Suitable	High	
		"Moderate suitability for crop cultivation in western parts, low suitability to the eastern border. Arenosols and fluvisols in the western parts and cambisols to the eastern parts up to the border."						

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - VEGETABLES		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
Zambezi			Not a major crop	Sweet pepper	"Well-drained to a depth of at least 600mm. Sandy to loam soils with a high level of soil fertility. Prefers pH levels between 5.5 and 7.0, but is variety dependent. Generally requires 400mm to 550mm of water. Daytime temperature range of 2 to 28°C, night of 16 to 18°C. Sensitive to frost."	Suitable	Medium	1.57%
			Not a major crop	Lettuce	"Performs well fertile loam soils with high organic matter. Prefers pH levels between 6.0 and 6.8. Generally requires 25mm of water per week but can double dependant on climate. Optimum temperature range is 15°C to 20°C. Sensitive to frost."	Suitable	Low	
			Sweet potato	Sweet potato	"Performs best in light sandy loam soils. Prefers pH levels around 6.0. Generally requires at least 400mm of water. Optimum temperature range is 21°C to 29°C. Sensitive to frost."	Suitable	High	

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - VEGETABLES		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
Karst	Rainfall	"Ranges between 400 and 500mm annually - more rainfall in central parts, and less (between 300mm and 400mm) in the south-eastern parts."	Potato	Potato	"Suitbale for a variety of soils, but best results are obtained from light soils that have good drainage and depth. Require good supply of moisture (800 -1200mm/ year). Require cool growing conditions (average temperature 7°C -20°C)."	Suitable	High	1.57%
	Temperature	"Generally greater than 22°C in nprthern parts then reduces to roughly 20°C in the south eastern parts. Temaprature range is generally between 5°C and 35°C annually. Summer: often above 35 & 40°C. Winter: between 20 & 30°C."	Onion	Onion	"Can be grown successfully in most soils. Prefer cool conditions in early months between 12 and 24 °C. Daily means of 25°C to 27 °C - accelerate the bulbing process and are preferred from the start of bulbing. Generally require between 500mm and 700mm of water."	Suitable	High	
	Likelihood of Frost	Moderate risk in winter months if temperatures go below 5°C.						

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - VEGETABLES		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
Karst	Daylight Length	"11hrs25min on average in winter. 12hrs50min on average in summer."	Tomato	Tomato	"Prefers sandy loam to clay loam soils, with a clay content of between 15 and 35%. Require a temperature range between 10 and 34°C. Optimum temperature range bewteen 26 and 29°C. Prefer fertile, humus-rich, free-draining, moisture-retentive soils."	Suitable	High	1.57%
	Soil Types	Mostly comprised of leptosols with more arenosols towards the eastern parts of the region.	Butternuts	Butternuts	"Generally thrives in well-drained soils with low salt levels and high organic matter. Loamy soils with good fertility and structure are preferred. Prefers pH levels between 6.0 and 6.5. Generally requires 25mm to 40mm of water per week. Optimim temperature range is 18°C to 24°C."	Suitable	High	
			Sweet Pepper	Sweet pepper	"Well-drained to a depth of at least 600mm. Sandy to loam soils with a high level of soil fertility. Prefers pH levels between 5.5 and 7.0, but is variety dependent. Generally requires 400mm to 550mm of water. Daytime temperature range of 2 to 28°C, night of 16 to 18°C. Sensitive to frost."	Suitable	High	
			Lettuce	Lettuce	"Performs well fertile loam soils with high organic matter. Prefers pH levels between 6.0 and 6.8. Generally requires 25mm of water per week but can double dependant on climate. Optimum temperature range is 15°C to 20°C. Sensitive to frost."	Suitable	High	
			Sweet potato	Sweet potato	"Performs best in light sandy loam soils. Prefers pH levels around 6.0. Generally requires at least 400mm of water. Optimum temperature range is 21°C to 29°C. Sensitive to frost."	Suitable	High	

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - VEGETABLES		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
North Central	Rainfall	"Ranges between 100 and 400mm annually - more rainfall in eastern parts. Less than 100mm along the coast annually."	Potato	Potato	"Suitbale for a variety of soils, but best results are obtained from light soils that have good drainage and depth. Require good supply of moisture (800 -1200mm/ year). Require cool growing conditions (average temperature 7°C -20°C)."	Suitable	High	1.57%
	Temperature	"Generally greater than 22°C in eastern parts and on Northern border. Ranges between 20°C and 22°C in central parts. Ranges between 17°C and 21°C from the coast towards the east. Temaprature range is between 5°C and 40°C annually. Summer: between 30 & 40°C. Winter: between 20 & 30°C."	Onion	Onion	"Can be grown successfully in most soils. Prefer cool conditions in early months between 12 and 24 °C. Daily means of 25°C to 27 °C - accelerate the bulbing process and are preferred from the start of bulbing. Generally require between 500mm and 700mm of water."	Suitable	High	
	Likelihood of Frost	Moderate risk in winter months if temperatures go below 5°C.	Not a major crop	Tomato	"Prefers sandy loam to clay loam soils, with a clay content of between 15 and 35%. Require a temperature range between 10 and 34°C. Optimum temperature range bewteen 26 and 29°C. Prefer fertile, humus-rich, free-draining, moisture-retentive soils."	Suitable	High	
	Daylight Length	"11hrs20min on average in winter. 12hrs30min on average in summer."						
	Soil Types	"Rock outcrops in north-west parts. Cambisol soils along parts of Northern border. Calcisol soils in a small area on the Northern border. Arenosols mostly run South of the cambisol and calcisol areas. Leptosols in southern parts."	Butternuts	Butternuts	"Generally thrives in well-drained soils with low salt levels and high organic matter. Loamy soils with good fertility and structure are preferred. Prefers pH levels between 6.0 and 6.5. Generally requires 25mm to 40mm of water per week. Optimim temperature range is 18°C to 24°C."	Suitable	High	
			Not a major crop	Sweet pepper	"Well-drained to a depth of at least 600mm. Sandy to loam soils with a high level of soil fertility. Prefers pH levels between 5.5 and 7.0, but is variety dependent. Generally requires 400mm to 550mm of water. Daytime temperature range of 2 to 28°C, night of 16 to 18°C. Sensitive to frost."	Suitable	Medium	
			Lettuce	Lettuce	"Performs well fertile loam soils with high organic matter. Prefers pH levels between 6.0 and 6.8. Generally requires 25mm of water per week but can double dependant on climate. Optimum temperature range is 15°C to 20°C. Sensitive to frost."	Suitable	Low	

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - VEGETABLES		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
North Central			Sweet potato	Sweet potato	"Performs best in light sandy loam soils. Prefers pH levels around 6.0. Generally requires at least 400mm of water. Optimum temperature range is 21°C to 29°C. Sensitive to frost."	Suitable	High	1.57%

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - VEGETABLES		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
Central	Rainfall	"Ranges mostly between 200mm and 400mm annually in most parts. Can be more +/- 400mm annually in an area north of Windhoek. Less than 100mm annually along the coast."	Potato	Potato	"Suitbale for a variety of soils, but best results are obtained from light soils that have good drainage and depth. Require good supply of moisture (800 -1200mm/ year). Require cool growing conditions (average temperature 7°C -20°C)."	Suitable	High	10.81%
	Temeperature	"<16°C to 18°C on average along the coast and increases inland. Central parts range between 20°C and >22°C on average. Eastern parts genrally between 19°C and 20°C. Temperature range is between 0°C and 45°C annually. Summer: between 30 & 40°C. Winter: between 20 & 30°C."	Onion	Onion	"Can be grown successfully in most soils. Prefer cool conditions in early months between 12 and 24 °C. Daily means of 25°C to 27 °C - accelerate the bulbing process and are preferred from the start of bulbing. Generally require between 500mm and 700mm of water."	Suitable	High	
	Likelihood of Frost	Likley in winter when temperatures go to 0°C and below.	Not a major crop	Tomato	"Prefers sandy loam to clay loam soils, with a clay content of between 15 and 35%. Require a temperature range between 10 and 34°C. Optimum temperature range bewteen 26 and 29°C. Prefer fertile, humus-rich, free-draining, moisture-retentive soils."	Suitable	High	
	Daylight Length	"12hrs45min on average in summer. 11hrs05min on average in winter."						
	Soil Types	"Western parts contain gypsisols, calcisols, regosols. Some rock outcrops on western border. Central parts contain regosols, cambisols, leptosols and arenosols. Eastern parts dominated by arenosols with low crop suitability."	Butternuts	Butternuts	"Generally thrives in well-drained soils with low salt levels and high organic matter. Loamy soils with good fertility and structure are preferred. Prefers pH levels between 6.0 and 6.5. Generally requires 25mm to 40mm of water per week. Optimim temperature range is 18°C to 24°C."	Suitable	High	

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - VEGETABLES		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
Central			Not a major crop	Sweet pepper	"Well-drained to a depth of at least 600mm. Sandy to loam soils with a high level of soil fertility. Prefers pH levels between 5.5 and 7.0, but is variety dependent. Generally requires 400mm to 550mm of water. Daytime temperature range of 2 to 28°C, night of 16 to 18°C. Sensitive to frost."	Suitable	High	10.81%
			Lettuce	Lettuce	"Performs well fertile loam soils with high organic matter. Prefers pH levels between 6.0 and 6.8. Generally requires 25mm of water per week but can double dependant on climate. Optimum temperature range is 15°C to 20°C. Sensitive to frost."	Suitable	High	
			Sweet potato	Sweet potato	"Performs best in light sandy loam soils. Prefers pH levels around 6.0. Generally requires at least 400mm of water. Optimum temperature range is 21°C to 29°C. Sensitive to frost."	Suitable	High	

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - VEGETABLES		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
South	Rainfall	"Less than 100mm along the coast, increases towards the east. From roughly the region's centre towards the eastern border, rainfall is between 100mm and 200mm annually. +/-200mm in northeastern parts."	Potato	Potato	"Suitbale for a variety of soils, but best results are obtained from light soils that have good drainage and depth. Require good supply of moisture (800 -1200mm/ year). Require cool growing conditions (average temperature 7°C -20°C)."	Suitable	Medium	2.36%
	Temeperature	"Ranges between <16°C and 20°C on average, warming gradually towards the east. From the central part of the region the average annual temperature ranges between 20°C and 22°C. Temperature range is generally between 5°C and 40°C. Summer: between 30 & 40°C. Winter: between 20 & 30°C."	Onion	Onion	"Can be grown successfully in most soils. Prefer cool conditions in early months between 12 and 24 °C. Daily means of 25°C to 27 °C - accelerate the bulbing process and are preferred from the start of bulbing. Generally require between 500mm and 700mm of water."	Suitable	Medium	

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - VEGETABLES		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
South	Likelihood of Frost	Moderate risk in winter months if temperatures go below 5°C.	Tomato	Tomato	"Prefers sandy loam to clay loam soils, with a clay content of between 15 and 35%. Require a temperature range between 10 and 34°C. Optimum temperature range bewteen 26 and 29°C. Prefer fertile, humus-rich, free-draining, moisture-retentive soils."	Suitable	High	2.36%
	Daylight Length	"11hrs00min on average in winter. 13hrs05min on average in summer."						
	Soil Types	Mostly low suitability for crop production. Centre of the region is mostly Leptosols, East of the region is mostly arenosols, and the west of region is mostly dune sand	Butternuts	Butternuts	"Generally thrives in well-drained soils with low salt levels and high organic matter. Loamy soils with good fertility and structure are preferred. Prefers pH levels between 6.0 and 6.5. Generally requires 25mm to 40mm of water per week. Optimim temperature range is 18°C to 24°C."	Suitable	Medium	
			Sweet Pepper	Sweet pepper	"Well-drained to a depth of at least 600mm. Sandy to loam soils with a high level of soil fertility. Prefers pH levels between 5.5 and 7.0, but is variety dependent. Generally requires 400mm to 550mm of water. Daytime temperature range of 2 to 28°C, night of 16 to 18°C. Sensitive to frost."	Suitable	Medium	
			Lettuce	Lettuce	"Performs well fertile loam soils with high organic matter. Prefers pH levels between 6.0 and 6.8. Generally requires 25mm of water per week but can double dependant on climate. Optimum temperature range is 15°C to 20°C. Sensitive to frost."	Suitable	Medium	
			Sweet potato	Sweet potato	"Performs best in light sandy loam soils. Prefers pH levels around 6.0. Generally requires at least 400mm of water. Optimum temperature range is 21°C to 29°C. Sensitive to frost."	Suitable	Medium	

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS		CROP PRODUCTION - VEGETABLES		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
			Current Production	Potential crops				
Orange River	Rainfall	"Rainfall is less than 100mm along the coast and into the central parts. From roughly the centre of the region towards the eastern border, rainfall is +/- 100mm annually."	Potato	Potato	"Suitbale for a variety of soils, but best results are obtained from light soils that have good drainage and depth. Require good supply of moisture (800 -1200mm/ year). Require cool growing conditions (average temperature 7°C -20°C)."	Suitable	Medium	4.72%
	Temperature	"Ranges between <16°C and 20°C in average, warming gradually towards the east. From the central part of the region the average annual temperature ranges betwee 20°C and 22°C. Temperature range is generally between 5°C and 35°C. Summer: between 30 & 40°C. Winter: between 20 & 30°C"	Onion	Onion	"Can be grown successfully in most soils. Prefer cool conditions in early months between 12 and 24 °C. Daily means of 25°C to 27 °C - accelerate the bulbing process and are preferred from the start of bulbing. Generally require between 500mm and 700mm of water."	Suitable	Medium	
	Likelihood of Frost	Moderate risk in winter months if temperatures go below 5°C.	Tomato	Tomato	"Prefers sandy loam to clay loam soils, with a clay content of between 15 and 35%. Require a temperature range between 10 and 34°C. Optimum temperature range bewteen 26 and 29°C. Prefer fertile, humus-rich, free-draining, moisture-retentive soils."	Suitable	High	
	Daylight Length	"11hrs00min on average in winter. 13hrs12min on average in summer."	Butternuts	Butternuts	"Generally thrives in well-drained soils with low salt levels and high organic matter. Loamy soils with good fertility and structure are preferred. Prefers pH levels between 6.0 and 6.5. Generally requires 25mm to 40mm of water per week. Optimim temperature range is 18°C to 24°C."	Suitable	High	
	Soil Types	"Western parts contain mostly fluvisols with some regosols and leptosols. Central parts mostly leptosols with some regosols. Eastern parts mostly leptosols. Arenosols and rock outcrops on eastern boundary."	Sweet Pepper	Sweet pepper	"Well-drained to a depth of at least 600mm. Sandy to loam soils with a high level of soil fertility. Prefers pH levels between 5.5 and 7.0, but is variety dependent. Generally requires 400mm to 550mm of water. Daytime temperature range of 2 to 28°C, night of 16 to 18°C. Sensitive to frost."	Suitable	High	
			Lettuce	Lettuce	"Performs well fertile loam soils with high organic matter. Prefers pH levels between 6.0 and 6.8. Generally requires 25mm of water per week but can double dependant on climate. Optimum temperature range is 15°C to 20°C. Sensitive to frost."	Suitable	Low	

PRODUCTION ZONE	AGROECOLOGICAL CHARACTERISTICS	CROP PRODUCTION - VEGETABLES		CROP REQUIREMENTS	LAND SUITABILITY STATUS	PRIORITY	CONTRI-BUTION
		Current Production	Potential crops				
Orange River		Sweet potato	Sweet potato	"Performs best in light sandy loam soils. Prefers pH levels around 6.0. Generally requires at least 400mm of water. Optimum temperature range is 21°C to 29°C. Sensitive to frost."	Suitable	Medium	4.72%

NOTES

NAMIBIAN
AGRONOMIC BOARD

www.nab.com.na