The development of cannabis in emerging markets- Evaluating the prospective value chain, market accessibility, and commercialisation

Research Report by

MH Rapetsoa

0510018F

Submitted to

School of Mechanical, Industrial & Aeronautical Engineering,
Faculty of Engineering and the Built Environment,
University of the Witwatersrand, Johannesburg, South Africa

Supervisor(s): Dr B Emwanu

A Research Project Report submitted to the Faculty of Engineering and the Built Environment, University of the Witwatersrand, in fulfilment of the requirements for the Master of Science in Industrial Engineering

Johannesburg, 2024

Student Declaration

I declare that this project report is my own, unaided work. It is being submitted for the Degree of Master of Science in Engineering in the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in any other University.

Signature of Candidate

28th Day of March 2024

Abstract

In recent years, the significance of small businesses in the growth of developing economies has been acknowledged, along with their ability to foster social development, create employment opportunities, advance innovations, and contribute to economic growth. The agricultural sector serves as a catalyst in building a strong economy by increasing income and employment opportunities for the poor while nurturing natural resources. This is evidenced by the vision stated in the Government's National Development Plan (NDP), which proposes to create close to 1 million jobs by 2030 within the agricultural sector.

This study aimed to determine the "strategic interventions required to ensure that South Africa is aligned with the regulatory, social, economic, and knowledge base needed for the effective commercialisation of the cannabis market". In doing so, knowledge experts were consulted through open-ended interviews to ascertain their views on the growth and trajectory of cannabis as an economic driver. This qualitative study adopted the Wengraf pyramid model to relate the "progression from the Central Research Questions (CRQ) differentiated into several Theory Questions (TQ) and the particular Interview Questions (IQ) and the non-verbal Interview Interventions (II)" (Wengraf, 2001). The selected qualitative method was best suited for this research as it assisted in breaking ground on themes that have limited literature, such as the current research. The data was collected from subject matter experts through open-ended interviews, allowing the participants to freely express and share their knowledge, views, and experiences. An 'inductive content analysis' method was used to analyze the data by transcribing and coding the information to identify common themes, links, and categories and gain more understanding of the data received.

The study claimed that cannabis has the potential to uplift the economy and alleviate poverty through its commercialisation and that the legal frameworks or lack thereof pose a barrier to the growth and development of this market. The research revealed that there is a greater gap in the market where the knowledge, expertise, and financial instruments are being underutilized therefore rendering South Africa a laggard with considerable ramifications for our global competitiveness. With much at stake and our staggering economy, the common theme was that erratic and deliberate action is required especially in a market where other countries that have legalized cannabis appear to be well under control and thriving. Cannabis has become one of the biggest disruptors of mainstream industries over the last decade, impacting sectors from pharmaceutical, food, and wellness to cosmetics. The subject experts collectively agreed that South Africa is missing out on a multibillion-dollar opportunity.

Acknowledgements

I wish to thank the following people:

- The Almighty God for His unfailing blessings
- My Mother, for her love, continuous support, prayers, and encouragement in all my endeavours.
- My Family for their support and understanding.
- My Supervisor for his guidance, patience, and for encouraging me at every level.
- All Respondents for their time, input, and willingness to participate in this study.

List of Figures

Figure 1 Industry Sectors Breakdown of Cannabis (New Frontier Data, 2019)……2
Figure 2 Botany of the Cannabis Plant (Fields of Green for all, 2010)…… 6

Figure 3 Agriculture and food value chain (KPMG 2013) …….. 8

Figure 4 Cannabis Value Chain (Haslun 2020, Lux research) …….. 9

Figure 5 Cannabis Consumer Products (Haslun 2020) …….. 9

Figure 6 Global CBD consumer health market (Grand View Research Inc. 2020) …….. 10

Figure 7: National Cannabis Masterplan for South Africa (NCMP) (2021) …….. 13

Figure 8: Cannabis license application process (SAHPRA 2022) …….. 14

Figure 9: Cannabis Revenue Projections for South Africa (Statista Market Insights 2023) …16

Figure 10: Global Cannabis Sales ((New Frontier Data 2022) ……..17

Figure 11 The research ‘onion’ (Saunders, et al., 2019) ……..18

Figure 12 "CRQ→TQ→IQ Pyramid Model" (adapted from Wengraf, 2001) ……19

List of Tables

Table 1 Research and Interview Question Framework……. 20

Table 2 Participant Profiles ……..…. 24

Table 3 Data Summation ……..……. 35

Nomenclature / List of acronyms

API	Active Pharmaceutical Ingredient
ARC	Agricultural Research Council
BBBEE	Broad-Based Black Economic Empowerment
CBD	Cannabidiol
CSIR	Council for Scientific and Industrial Research
DALRRD	Department of Agriculture, Land Reform and Rural Development
EU GMP	European Union standards of Good Manufacturing Practices
INCB	International Narcotics Control Board
SAPHRA	South African Health Products Regulatory Authority
SAPS	South African Police Service
SME	Small and Medium-sized Enterprises
THC	Tetrahydrocannabinol

Table of Contents

Student Declaration i
Abstract ii
Acknowledgements iii
List of Figures iv
List of Tables v
Nomenclature / List of acronyms vi
Chapter 1: Introduction 1
1.1 Background 2
1.2 Problem Statement 3
1.3 Critical Research Question 3
1.4 Research Aim and Objectives 3
1.4.1 Research Aim 3
1.4.2 Research Objectives 3
1.5 Motivation 3
1.6 Summary of Methods 4
1.7 Delimitations of the study and scope 4
1.8 Assumptions 4
1.9 Structure of the report 4
Chapter 2: Literature Review 5
2.1 Introduction 5
2.2 History of the Cannabis Sativa Species 5
2.3 The Cannabis Value Chain and Market 8
2.4 Commercialisation and Regulatory Framework 11
Chapter 3: Research Design and Methodology 18
3.1 Research Methods 18
3.2 Research Design 19
3.2 Research Instruments 19
3.4 Sampling Methods 22
3.5 Data Collection and Analysis 23
3.6 Validity and Reliability 23
3.7 Ethical Clearance 23
Chapter 4: Data Analysis and Presentation 24

4.1 Participant Profiles ……..….24

4.2 Applied Data Analysis …….24

4.3 Data Presentation ……..…25

Chapter 5: Discussion 28

5.1 Findings related to the Commercialisation Theme……..…… 28

5.2 Findings related to the Cannabis Knowledge Theme……..… 30

5.3 Findings related to the Cannabis Regulatory System……..… 30

Chapter 6: Conclusion and Recommendations 33

References.....36

Appendix A: Participant Consent Form Template.....43

Appendix B: Participant Interview Schedule.....44

Appendix C: Sub-Themes.....46

Chapter 1: Introduction

Background

Cannabis is used to produce various goods; its extensive cultivation purposes have brought about its categorization as an “agricultural commodity”. Johnson (2018) explored the benefits using of cannabis to produce “food and beverages, cosmetics and personal care products, nutritional supplements, fabrics and textiles, yarns and spun fibers, paper, construction, and insulation materials as well as other manufactured items” (Johnson 2018:6). The methods used to consume cannabis vary from adding it as an ingredient in food products and inhaling it as smoke or vapor. It is grown as a crop which has the effects of a psychoactive drug. According to Sterling, the cannabis sector “shares clear similarities with agriculture, food, tobacco, and pharmaceuticals” (Sterling et al. 2018:3)

Regulatory restrictions within the cannabis industry have prohibited its development and exploration however, the introduction of the licensing framework in 2017 for the "domestic cultivation of cannabis and manufacturing of cannabis-related pharmaceutical products for medicinal and research purposes" by the South African Health Products Regulatory Authority (SAHPRA) and the Department of Health has created increased Local & International interest in the development of the commodity (SAHPRA 2017:3).

Three separate events relating to the legal state of cannabis have occurred in South Africa since 2017. Firstly, the Department of Health developed and introduced a licensing framework for the domestic cultivation and manufacture of medicinal cannabis. Secondly, the Constitutional Court ruled in September 2018 that adult consumption, possession, and cultivation of cannabis was no longer classified as a criminal offense and presented Parliament with 24 months to align with this ruling. The Drugs and Drug Trafficking Act (1992) was most noted, although the ruling would potentially impact a range of legislation and regulations; however, policy uncertainty concerning the court's ruling on what constitutes private use of cannabis persists.

Finally, was the revision of the Cannabidiol (CBD) schedule in 2019 by the Minister of Health from the operation of the "Schedules to the Medicines and Related Substances Act" (SAHPRA 2019). CBD, the active ingredient of cannabis was changed from a schedule 7 (controlled substance) to a schedule 4 (prescription only) drug. This change in events signified initial steps for South Africa and other countries towards decriminalizing and legalizing cannabis for recreational and medicinal purposes as depicted by figure 1 below, there are various sectors to be explored within the value chain.

Figure 1: Industry Sectors Breakdown of Cannabis (New Frontier Data, 2019)

1.2 Problem Statement

South Africa has reported a severe decline in economic activity with a GDP (Gross Domestic Product) of -6.4% in 2020 versus a 3.2% in 2011 as well as an increase in the unemployment rate in the year 2020 of 29.9% compared to the 2011 average of 24.6% according to the World Bank report (2022). Given the current state of South Africa's economy, with the unemployment rate reaching 43.2% in the first quarter of 2021 (StatsSA 2021), the necessity for radical and innovative economic recovery is rapidly becoming a topic of importance. In a country where much of the population is plagued by poverty and increasing unemployment, the reality of South Africa's declining economy is proving to be severe. Maas & Herrington (2006:12), believed that through efforts of creating economic growth, the "promise of sustainable development remains bright."

The economic growth initiatives in South Africa and determination to alleviate poverty have demonstrated that entrepreneurs are the core actors of sustainable development, and a "key weapon in the fight against poverty" (Mboweni, 2000:1). It has, therefore, become crucial for South Africa to be entrepreneurial in its thinking by creating new businesses and initiatives that will, in turn, generate more opportunities, increase the job market and raise the standard of living for society. The World Bank (2013) conducted research that concluded that "the food and beverage industry is forecast to reach USD 1 trillion in Africa's regional economy by 2030 with immense potential to create gainful job opportunities and enhance economic relief". According to Sylvester (2018:31), "South Africa's agricultural success lies in the effective application of scientific innovations and interactive exchanges between farmers, especially in terms of subsistence and small-scale farmers".

The emergence of the cannabis industry has the potential to provide the economic relief necessary to relieve South Africa of these social and economic challenges however the regulatory climate and uncertainty with restrictions raise the need for policy evolution and implementation of the National Cannabis Commercialisation Strategy of 2019. This strategy intends to increase economic growth, create jobs, and alleviate poverty.

Commercialisation is broadly defined by Raj & Hall (2020) as the "transformation from subsistence production (production for own consumption) to production for sale of surplus products and services" (Raj & Hall 2020:2).

The appropriate guidelines necessary to prioritize and support the commercialisation of the cannabis market and value chain in South Africa are not in place for the creation of an industry that will contribute to economic diversification. Therefore, such guidelines are essential to spur action and bring about the change required for the cannabis industry to be accessible, sustainable, and capable of competing on a global scale.

1.3 Critical Research Question

What strategic interventions are required to ensure that South Africa is aligned with the regulatory, social, economic, and knowledge base needed for the effective commercialisation of the cannabis market?

1.4 Research Aim and Objectives

1.4.1 Aim

The aim of this study was to identify the change management actions required to establish an inclusive, sustainable, and globally competitive cannabis industry in South Africa

1.4.2 Objectives

1. To analyse the framework of the cannabis value chain
2. To assess the regulatory and market attributes across the cannabis value chain
3. To determine the factors that can be implemented to facilitate an increase in investment, research and technology, and product development within the cannabis industry to ensure effective commercialisation.

1.5 Motivation

Our country is riddled with economic challenges, unemployment, and youth despondency due to lack of employment. The researcher has acknowledged this unfortunate climate and endeavors to find means that will contribute positively to the country as well as give hope and dignity through employment opportunities and economic emancipation. It has become critical to explore innovative means of creating jobs, contributing to economic activities, and being radical about changing the current state of our country. This study discusses a value chain with vast opportunities that are inclusive and economically viable.

1.6 Summary of Methods

Data collection was done mainly through interviews with seasoned subject matter experts within the context of the South African cannabis value chain. The related and applicable qualitative data was corroborated by data obtained from secondary/archival sources to ensure the credibility of the research. Qualitative research methods were adopted to address the above objectives, this allowed for data to be generated from the participants' experiences, thoughts, beliefs, and perceptions thus providing more insight into the cannabis value chain.

1.7 Delimitations of the study and scope

According to Patton (2014), the amount of determination, time, and financial resources that a researcher invests in a study influences its effective execution. The delimitation of this study was access to reliable, relevant, and readily available information on hemp & cannabis consumption due to the regulatory complexity of the industry. The scope was limited to the South African context, with data collected through published journals and input from interviews with knowledge experts in the field of cannabis.

1.8 Assumptions

The aim of this study was to identify the change management actions required to establish an inclusive, sustainable, and globally competitive cannabis industry in South Africa. The assumptions made regarding the study are that the resources and methods used will elicit reliable responses, the posed questions are well understood by the respondents, and that the respondents provided accurate and truthful expressions in their area of knowledge.

1.9 Structure of the report

The first chapter gives an introduction and background of the study, highlighting the problem statement and research question which is what strategic interventions are required to ensure that South Africa is aligned with the regulatory, social, economic, and knowledge base needed for the effective commercialisation of the cannabis market. The aim and objectives of the study are discussed, as well as the delimitations and assumptions.

Chapter Two follows a sequential discussion on the history of cannabis, its value chain and market, and the commercialisation and regulatory framework.

The Research Design and Methodology are discussed in Chapter Three, wherein the Wengraf (2001:63) CRQ-TQ-IQ (critical research question-theory question-interview question) was adopted for the qualitative research. In chapter four the data is analysed and presented followed by the discussion and interpretation of findings in chapter 5, and a presentation of the conclusion and recommendations of the study in chapter six.

Chapter 2: Literature Review

2.1 Introduction

The term agriculture means "cultivation of land; the science and art of producing crops and livestock for economic purposes" (Byrnes, 1996:215), where ‘ager’ and ‘cultura’ are Latin terms meaning Land/ field and cultivation respectively (Chandrasekaran, 2010:22). In South Africa, the sector of agriculture is characterised by the term dualism which is described by AgriSETA as “a modern commercial farming sector using hired farm workers alongside small-scale farmers, mostly in the former homeland areas” (AgriSETA, 2010). Mhone (2000:10) defined the term 'dualism' as a "useful way of describing the agricultural sector, both in terms of understanding the economics of the sector and planning skills development interventions". According to (Whitbread, *et al.* 2011), dualism therefore indicates both a formal aspect or established sector and an informal sector that are dependent on each other, and government intervention for effective integration.

The Department of Agriculture, Forestry & Fisheries (DAFF) acknowledges the central role of agriculture in building an economy that is robust and helps to address the national ills of inequality, low income, and unemployment, especially amongst the poor (Department of Agriculture, Forestry & Fisheries, 2019:8). The agricultural sector supplies products for domestic needs and exports raw materials including maize, sugar, groundnuts, tobacco and other farm products (Koira, 2014:6). According to (Statistics South Africa, 2017), agriculture in 2017 had the biggest contribution to the Gross Domestic Product (GDP) with the total income for farming at R332.8 billion. A research report by Sung (2018:13), concluded that the factors that will assist in promoting the “competitiveness of farmers and the agricultural sector include good governance throughout government and industry, institutional innovations for commercial and small-scale farmers, improving the quality of (school) education (particularly in mathematics and science), and skills training, promoting research in agriculture, and farmers adopting new technologies”. However, additional interventions should be implemented to address social ills such as unemployment and a declining economy. This commitment can be seen in the adoption of the National Development Plan (NDP) wherein the government commits to creating approximately 1 million jobs by 2030 within the agricultural sector (National Planning Commission, 2012).

2.2 History of the Cannabis Sativa Species

Cannabis Sativa L. is a yearly crop grown for its diverse applications and managed in different ways subject to the end use. Generally, it is grown for fiber (plant stems), seed (grain from females), and cannabinoids (produced on trichomes of the bracts on female flowers) production (Zuardi, 2006:2). According to Roussell (2012:19), Cannabis is “a seed-born, upright, tall stemmed plant with leaves that are serrated and divided with hair-like fibers” and further adds that, “biologically, it is referred to as Cannabis sativa, an annual herbaceous plant, with genes belonging to the Cannabaceae family”. Ames

(1958:215), asserts that cannabis is the "only plant in the world that can be used medically, for its fiber, as well as taken as a drug". Published literature on the history of cannabis collectively states that people have used it as a source of food, as an alternative to medicine, as an industrial fiber, for personal recreation, and for religious purposes. Literature sources indicate that the classification of the crop as "Cannabis Sativa" (meaning cultivated) was scientifically done in 1735. According to Ames (1958:198), 2737 BC was the initial recording of its first use by the Chinese for what is believed to have been medicinal use.

The Indian population was also reported to have used the plant for both medicinal use and spiritual purposes from 650 BC (Ames, 1958). Hemp fiber was introduced in the 13th century as a raw material for cloth and Italian linen in Central and Southern Europe (Ames, 1958). According to Huestis et al, (1992). the generic term for cannabis sativa is cannabis which represents the various "psychoactive preparations of the plant"; while the delta-9-tetrahydrocannabinol (THC) is the "major psychoactive constituent", and cannabinoids refer to the compounds that are similar in structure to the THC. Mark & Joy (2001:41) state that there are approximately 70 unique compounds that can be found in the plant known as Phytocannabinoids consisting of Tetrahydrocannabinol (THC) a "cannabinoid that produces a psychoactive effect" and contains medical properties, and Cannabidiol (CBD) a cannabinoid with typically medical benefits.

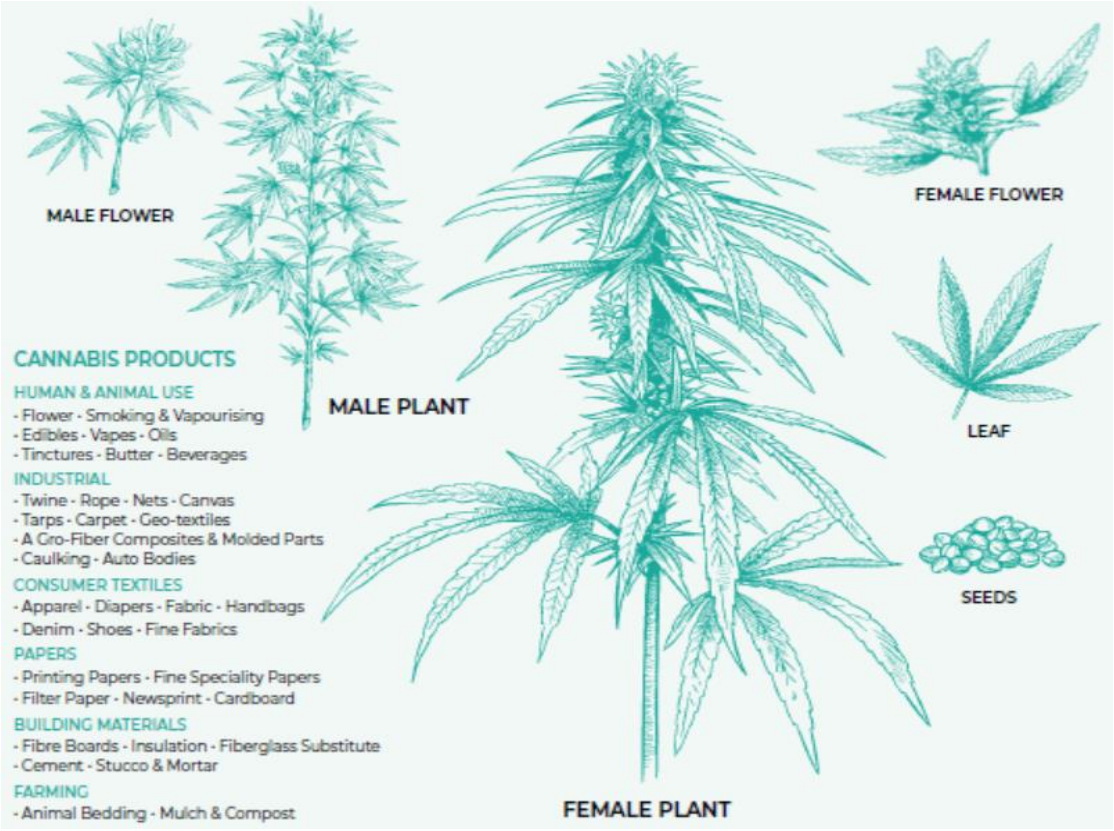

Figure 2: Botany of the Cannabis Plant (Clark M, Riboulet-Zemouli K in '*Fields of Green for all'*, 2010)

According to Clark (2019) “Hemp, or industrial hemp (from Old English hænep), from the northern hemisphere, is a variant of the Cannabis sativa plant species grown specifically for the industrial uses of its derived products.” Tourangeau (2015) further clarifies that Hemp is listed in the Canadian Journal of Criminology & Criminal Justice, 57: 528–554 as “one of the fastest-growing plants and one of the first to be spun into usable fiber 10,000 years ago.”

Natural fibers and their products have dominated for centuries and "their economic, societal, and environmental benefits have been established, providing opportunities for development in agriculture and manufacturing" (Allen *et al* 2019). According to Allen *et al* (2019), Hemp fibers have properties both mechanical and physical that are well suited for a variety of applications such as pharmaceutical, textile, energy, construction, and paper. Lash (2002) adds that Hemp cultivation dating back to 8000 BC was recorded in Central Asia where it was used for various purposes including ropes, sails, paper, and clothing. Small & Marcus (2003) further clarifies that industrial hemp is a “strain of the Cannabis sativa plant species of which marijuana is also a variant.”

Published Journals (Van der Werf, 2004; Piotrowski & Carus, 2011; La Rosa *et al.*, 2013; Pil *et al.*, 2016) state that the advantages of using hemp fibers as an environmentally friendly alternative to polluting materials have been well documented in industries such as textiles, construction, paper, and biocomposites. Research reports also show over “25,000 individual consumer products that can be manufactured using Hemp” (Giadha *et al* 2019; Grand View Research Inc., 2020). It is a “multi-functional, highly versatile crop currently used as a raw material for many traditional and novel industrial applications” (Amaducci *et al.*, 2015). Johnson (2018) added that “Hemp seed and oil cake can be used in the manufacture of food supplements, cosmetics, and medicine”. According to Amaducci *et al.* (2015), the simplicity of techniques required to cultivate hemp and the low levels of input requirements have raised an interest in the crop which suggests that agricultural principles and the production of hemp products can be sustained.

Cannabis and Hemp are types of the same plant called “Cannabis Sativa” (Bowling *et al*, 2020). Confusion often arises around their differences because they share the same species name. Cannabis, which contains the psychoactive THC component, is derived from the flowering tips of the Cannabis Sativa plant (Haslun, 2020), while hemp seed oil (cannabis sativa seed oil) is cold pressed from the seeds that contain no THC and small amounts of CBD (Clark *et al.*, 2019). Globally, Industrial Cannabis is cultivated in over 30 countries where thousands of products are developed from hemp, encompassing sectors such as construction materials, food, paper, plastics, polymers, textiles, technical lubricants, and bioenergy. The demand for industrial hemp materials means it can be farmed on a large, commercial scale or potentially act as a subsistence-based crop for rural farming areas (Clark *et al.*, 2019).

2.3 The Cannabis Value Chain and Market

Studies on the value chain of a business have demonstrated the importance of analysis when trying to understand the factors that influence profitability in the long term and during the establishment of an effective strategy. The process of a value chain has been broadly classified as "a set of activities, services, and products that lead to a product or service that reaches the final consumer" (Kaplinsky and Morris 2001:19). According to Kaplinsky and Morris (2001), a value chain analysis, which "focuses on the dynamics of interlinkages within the productive sector, (especially how businesses and countries are globally integrated), is a more effective method of exploring global trends than the traditional approaches of economic and social analysis". They concluded that "global value chains that concentrate on inter-linkages" allow for "easy uncovering of the dynamic flow of economic, organizational, and coercive activities between producers within different sectors even on a global scale". The 'Kaplinsky and Morris' approach to value chain analysis characterises the performance of chain activities and addresses how value can be created and shared among participants.

The studies and research of production values chains globally, coupled with frameworks and policies have benefited marginalized countries and producers by enabling them to participate in economic activities. According to Sterling *et al.* (2018), the cannabis industry is similar to various sectors of agriculture, food, tobacco, and pharmaceuticals as it is also grown as a crop that may be consumed as a food or ingredient and inhaled as smoke or vapor. The value chain characterizes how diversified and varied the individual stages and flow of products are in the sector, as it encompasses Research & Development companies, broad manufacturers, subsistence farmers, and high-technology agricultural corporations as well as small and medium-sized enterprises (SMEs) and multinational businesses.

Figure 3 (KPMG, 2013:7) below depicts the agriculture and food value chain, its complexity demonstrates the relationship between the numerous economic options that share a common objective of satisfying the demands of the consumer.

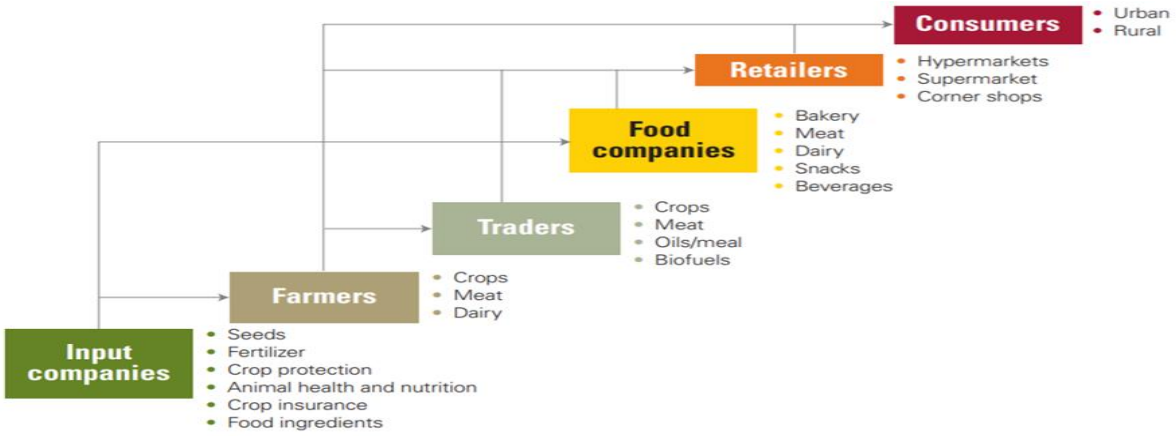

Figure 3: Agriculture and food value chain (KPMG 2013)

The cannabis value chain can be viewed in four segments namely, cultivation, distribution, processing, and consumer products whereby each category includes a degree of diversity and specialization as shown in Figure 4.

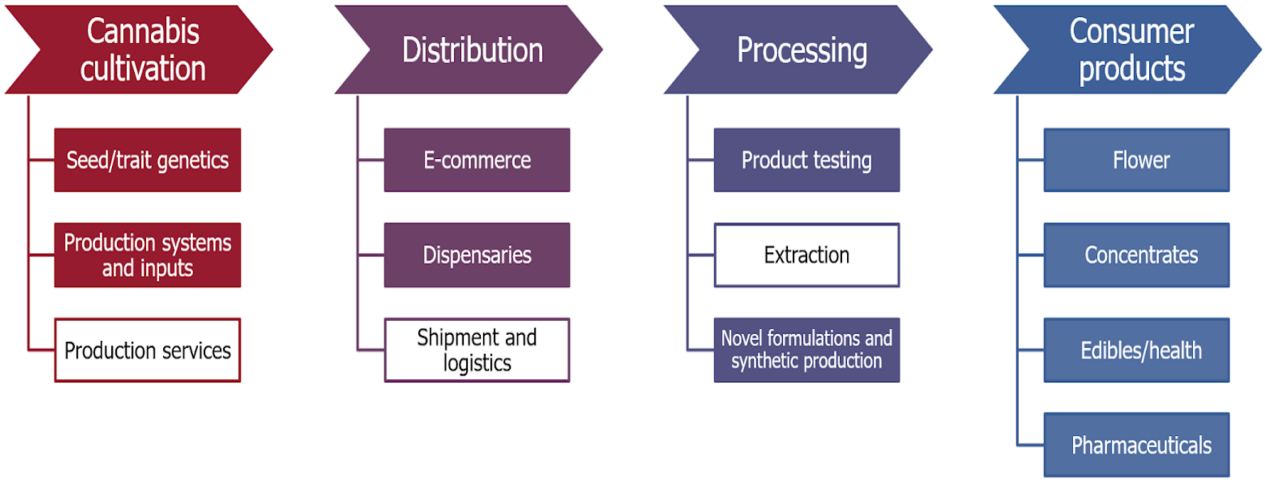

Figure 4: Cannabis Value Chain (Haslun 2020)

Building on the evidence shown in figure 4, the consumer products category has further various components as depicted in Figure 5 below.

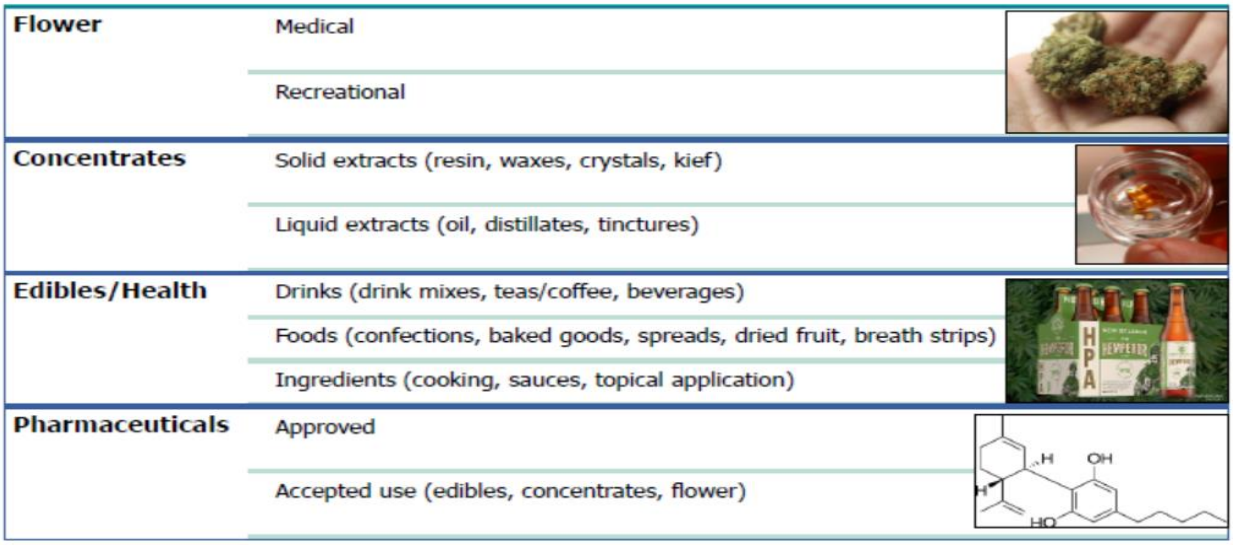

Figure 5: Cannabis Consumer Products (Haslun 2020)

According to Haslun (2020), statistical reports show that consumption of cannabis for medicinal purposes "accounts for a significant share of the market, where countries such as Australia, Canada, Chile, Colombia, Germany, Greece, Israel, Italy, the Netherlands, Peru, Poland, Portugal, and Uruguay, have legalized the use of cannabis for medicinal purposes". The medical cannabis industry began showing rapid growth in 2019 when a digital cannabis healthcare platform HelloMD announced its intention to expand into Africa and launch in South Africa.

The announcement followed after the first Cannabis cultivation license was issued by the South African Health Products Regulatory Authority (SAHPRA) in 2018 to the cultivation company "House of Hemp" (Grand View Research Inc.,2020).

The Cannabis Market

A report by Research & Markets (2021) indicated that in 2020, the global cannabis market was valued at $20.5 billion, and the projections indicate that by 2026, it is expected to grow significantly, reaching $90.4 billion, with a 28% compound annual growth rate (CAGR). According to the report the growth of medical applications and increasing legalization in some countries are primary drivers of the market increase as well as an improvement in social acceptance and overall perception of the plant. The valuation of global cannabis demand significantly depends on country-specific assessments related to the number of cannabis users, consumption levels, and pricing (Giadha *et al.* 2019). However, the complexity of the regulatory structures regarding the production and use of cannabis acts as a limiting factor for market growth (Clark *et al.* 2019).

Cannabidiol (CBD), the "active ingredient of cannabis, which is derived directly from the hemp plant indirectly stimulates the endocannabinoid system to produce cannabinoids" as the non-psychoactive component of the cannabis plant (World Health Organization 2017); it has experienced a significant growth trajectory in the consumer market. According to the global CBD market analysis conducted by Grand View Research Inc. (2020), it showed that CBD penetrated "3.2% of the global consumer health market with $8.2 billion; achieving a compound annual growth rate (CAGR) of 42.8% compared to 2.9% in overall consumer health markets from 2016 ($2.8 billion)" as shown in figure 6 below. The increase is driven by health-conscious consumers, an aging population, and growth in emerging markets (KPMG 2020).

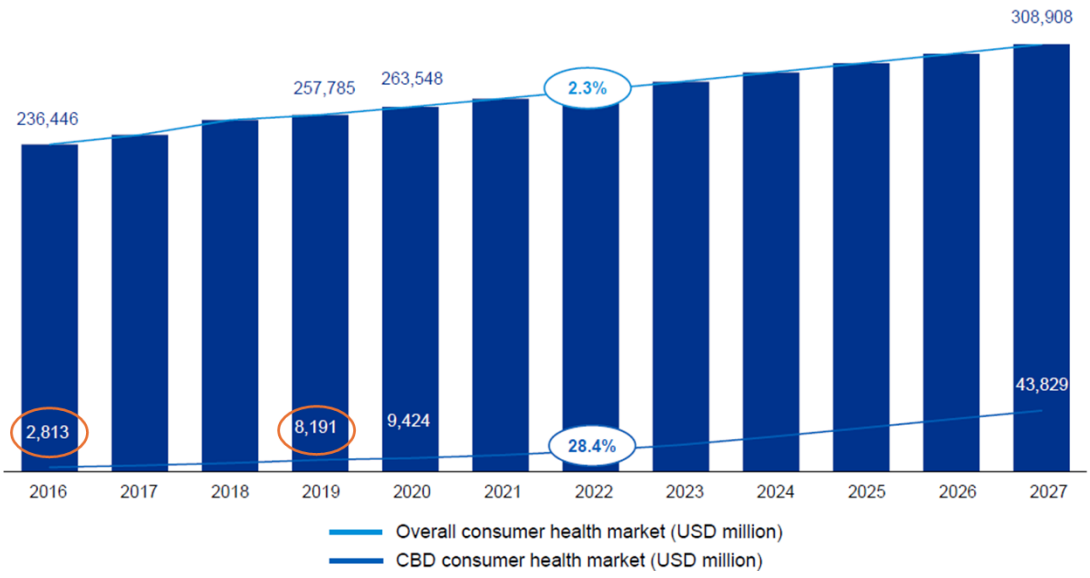

Figure 6: Global CBD consumer health market (Grand View Research Inc. 2020)

Elsewhere, reports by Prohibition Partners (2021) indicate that consumer health is a $250 billion industry globally and is projected to increase exponentially across categories of over the counter (OTC) medicine, vitamins, and dietary supplements (VDS). Relaxation of CBD regulations coupled with improved awareness of the health benefits of CBD has contributed to said sales growth and projected figures. According to Grand View Research Inc. (2020); "North America offers the largest markets for CBD end users ($4.9 bn) with the United States and Canada accounting for 60% of the market" since the adjustment of regulations in 2018. The report further discusses Latin America which positioned itself as the second largest in the making with a fourteen percent share in 2019 ($1.2 bn) and Europe as the third largest with twelve percent ($0.9 bn) supported by a regulatory environment that is rapidly developing.

The Global exports and imports of cannabis similarly showed an increase between 2014 and 2018, reaching $12.9 million in 2018 (Prohibition Partners, 2021). Primary contributors to the success of the cannabis markets can be attributed to its medicinal properties, amendment of the legal framework, and the optimization advances in "genetic development and intellectual property" (IP) (Matabeni *et al*, 2019). Africa has historically seen a small share of the global value of the finalized goods as the crops are typically exported as raw materials, therefore minimum value is added by the continent to reduce this risk. Policymakers should consider the opportunity of exploiting the potential downstream stages of cannabis value addition thereby retaining more of the value chain in Africa. Establishing local processing, manufacturing, and other value-adding steps of the supply chain on the continent will amplify wealth creation in Africa (Giadha *et al.* 2019).

2.4 Commercialisation and Regulatory Framework

The commercialisation of agricultural goods represents a multifaceted challenge within the agricultural production system. It involves balancing the advantages and limitations of supply to meet the dynamic and rigorous requirements of global, regional, national, and local markets (Rodríguez, 2016:13). According to Raj & Hall (2020), "agricultural commercialisation is a complex and long-term process where both the production inputs and outputs, as well as the decision-making behavior in production and marketing", are considered. Generally, commercialisation is considered in terms of the "volume of marketable commodities" (Jaleta *et al* 2009). In other words, a farmer is said to be commercialized if "they are selling a significant surplus of their agricultural products, but the concept of commercialisation is not limited to selling surplus products in markets rather commercialized farmers need to focus on market demand when making production decisions instead of selling product due to a production surplus." (Raj & Hall, 2020).

The regulatory shift in the legalization and commercialisation of Cannabis Sativa (Cannabis) has placed it ahead on the agenda of policymakers and raised public debate globally. Bowling (2020) indicates that this has opened the market to multinational corporations, who are strategically positioned to leverage the link between cannabis and their existing products and engage in cross-selling across various sectors including tobacco, alcohol and beverage, agriculture, and pharmaceuticals (Bowling *et al.*, 2020). This shift necessitates swift commercialisation and amendments to the regulations that will enable entry into the market.

In terms of the Drugs and Drug Trafficking Act (1992) cannabis is considered an illegal drug. The South African Health Products Regulatory Authority published an expansive list of regulations used over the years to prohibit its "cultivation, possession, and use". It was criminalized by the Medical, Dental, and Pharmacy Act (1928) and, is currently regulated by the Medicine and Related Substances Act (1965) as well as the Drugs and Drugs Trafficking Act (1992). These regulations "permit the cultivation of Cannabis solely for medicinal and research purposes" (South African Health Products Regulatory Authority, 2017).

According to the South African Health Products Regulatory Authority (2017), South Africa forms part of three international treaties influencing the legal status of commercialisation:

- The UN Single Convention on Narcotic Drugs, 1961 (as amended by the 1972 Protocol) which states that "As a signatory to the Single Convention, South Africa is committed to complying with its obligations by controlling the cultivation of cannabis for medicinal use and reporting to the International Narcotics Drug Control Board (INCB) on volumes of production and manufacture. These obligations require South Africa to minimize the risk of diversion of cannabis and to reserve its use for appropriate medical and scientific purposes only."
- The UN Convention on Psychotropic Substances, 1971
- The UN Convention Against Illicit Traffic in Narcotic Drugs and Psychotropic Substances, 1988

The South African Health Products Regulatory Authority (2017) stipulates that subject to the "Medicines Act and in line with the Single Convention, the use, cultivation, and harvesting of Cannabis and the manufacture of Cannabis-containing products for medicinal use may only occur through a permit issued by the Department of Health and a license issued by SAHPRA". The authorities responsible for regulating the cannabis plant for Industrial purposes (low THC – less than 0.2%), are the Department of Agriculture, Land Reform, and Rural Development (DALRRD) while the Department of Health (DOH) together with the South African Health Products Regulatory Authority (SAHPRA) regulates the medical/pharmaceutical cannabis - including the cannabis plant material that exceeds the 0.2% THC Limit

Following the South African Cabinet's decision in July 2019 to develop a National Cannabis Commercialisation Strategy to grow the economy while increasing jobs, and alleviating poverty, a draft of the National Cannabis Masterplan for South Africa (NCMP) (2021) was released. The plan challenges current regulations arguing that "appropriate policy framework and new legislation to regulate the commercialisation and industrialization of cannabis" should be developed and be able to "adapt to new developments regarding specific cannabis products". The NCMP intends to finalize the Drugs and Drugs Trafficking Act and, lift the limitations that are currently prohibiting commercialisation throughout the value chain (NCMP version 5, 2021:5). South Africa has realized that the growth and progress of the cannabis sector is centered on a variety of strategic interventions that are essential to establishing a viable and enduring cannabis industry, which, in turn, can significantly impact economic growth, poverty reduction, and employment opportunities (Matabeni *et al.* 2019). The Draft Cannabis Masterplan (2021:6) depicted in figure 7 below addresses intervention measures relating to:

- An effective regulatory system
- Sustainable seed supply systems
- Research, Development, and Innovation (RD&I)
- Producer support system

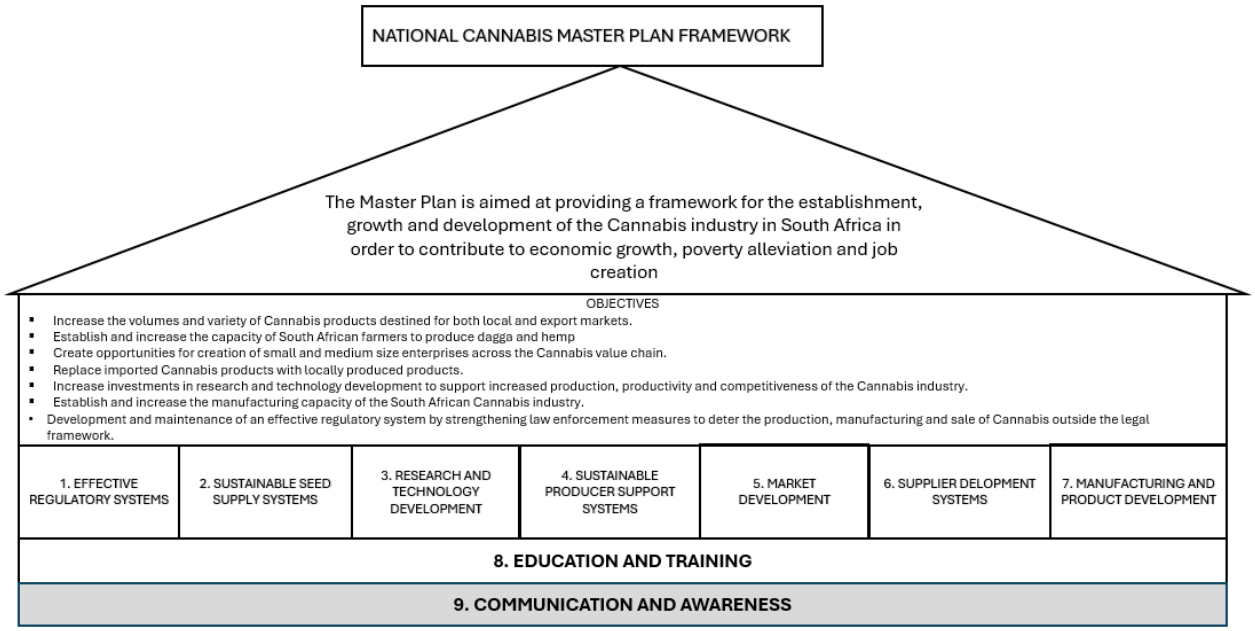

Figure 7: National Cannabis Masterplan for South Africa (NCMP) (2021)

There has been minimal improvement and implementation of the Masterplan since its inception in 2021, save for further draft documents and established committees (Operation Vulindlela & Phakisa Action Lab) that seem to make no progress on the regulatory reforms and commercialisation of cannabis. However, changes to the regulatory framework and legislative context of cannabis are emergent, and the debate on its legalization and commercialisation have intensified since the Cannabis for Private Purposes Bill was signed into law in May 2024 (Parliament of the Republic of South Africa 2024).

The Bill, now referred to as the Cannabis for Private Purposes Act 7 of 2024 (Act) establishes a legal framework for the use, possession, and cultivation of cannabis in South Africa (Cliffe Dekker Hofmeyr Attorneys 2024). The long-anticipated Act was met with disapproval as significant restrictions on the legal cultivation and commercial trade of cannabis remained unchanged. Moreover, cultivation of medicinal cannabis remains decriminalized for license holders (including cultivators, manufacturers, distributors, wholesalers, exporters, and importers) who are approved by the South African Health Products Regulatory Authority (SAHPRA), under the provisions of Section 22C(1)(b) of the Medicines and Related Substances Act 101 of 1965 (SAHPRA 2022). These licenses are issued to establishments that meet the regulatory requirements of cultivating or manufacturing cannabis for medicinal purposes for approved local, export, or import markets. The license application process is shown in figure 8 below.

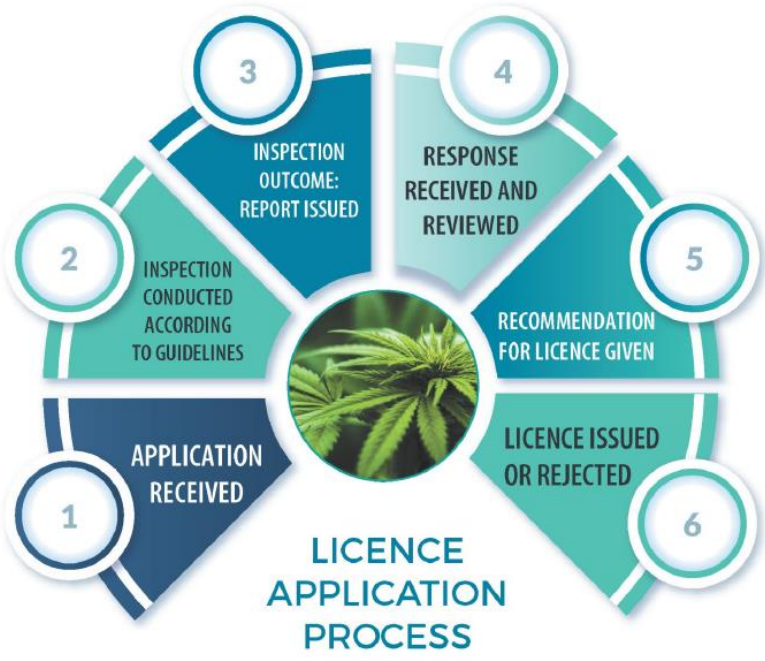

Figure 8: Cannabis license application process (SAHPRA 2022)

The South African Health Products Regulatory Authority follows a strict process for license approval and offers guidelines on the application process highlighting the minimum requirements in terms of quality, security, and standard operating procedures relating to the cultivation of cannabis and the manufacture and use of cannabis-related pharmaceutical products for medicinal and research purposes. The process as depicted in figure 8, can take several months to complete, and while the process can be lengthy, it is essential for compliance and ensuring the safe production of cannabis and related products. In addition to the license application to SAHPRA, Applicants will also be required to apply to the Director-General of Health for a permit in terms of the provisions of Section 22A(9)(a)(i) of the Medicines Act to acquire, possess, manufacture, use or supply Cannabis for medicinal use (SAHPRA 2017).

The regulations concerning the commercial production and distribution of cannabis will therefore continue to evolve until the alignment of the various ministries, regulatory bodies, and stakeholders is achieved thereby presenting an Act that is concise and unambiguous. In parallel with the Cannabis Act is the revision of the Plant Improvement Act 11 of 2018 which "provides for import and export control of certain plants and propagating material, maintaining the quality of such plants and propagating material, and ensuring the usefulness of the products thereof for agricultural and industrial purposes" (Cliffe Dekker Hofmeyr Attorneys 2024).

The revised Act has increased market demand, exploration, and the economic growth projections of Hemp, and the legal export of the plant to countries with limited cultivation capacity is seen as an added advantage. The cultivation of hemp permits are issued by the Department of Agriculture, Land Reform, and Rural Development. Cliffe Dekker Hofmeyr Attorneys (2024) further state that the Act addresses key legalized activities for permit holders such as:

- the importation of plants or propagating material for breeding, research, or cultivation.
- propagation of plants by a breeder or researcher in relation to a breeding or research programme to develop new or improved hemp varieties.
- sale of hemp seed, seedlings, plants or cuttings.
- cleaning and conditioning of seed for cultivation.
- export of plants or propagating material for cultivation purposes; and
- cultivation of hemp for seed production, seedling production, and production of grain or material for industrial purposes.

Since the 2018 Constitutional Court ruling and implementation of the National Cannabis Masterplan in 2021, the commercialisation of cannabis has shown substantial revenue growth The Statista Market Insights (2023) report indicates that the South African legal Cannabis market is expected to reach $308 million in revenue by 2024 as illustrated in figure 9 below, leading to a market volume of $326 million

by 2029. This translates to a 1.19% annual growth rate which the report further states is due to an increased demand for cannabis commodities such as:

- The THC Flower which is the dried cannabis flower containing tetrahydrocannabinol (THC), the psychoactive compound and a key product for both medical and recreational uses.
- Hemp Biomass Plants rich in cannabidiol (CBD) and other cannabinoids, this is the plant material used for CBD extraction or other industrial purposes.
- THC/CBD Distillates or Isolates which are highly concentrated forms of THC or CBD, often used in edibles, tinctures, and topicals.
- Crude Oil that is extracted from cannabis plants and contains a blend of cannabinoids and terpenes. The oil serves as a base for further processing.

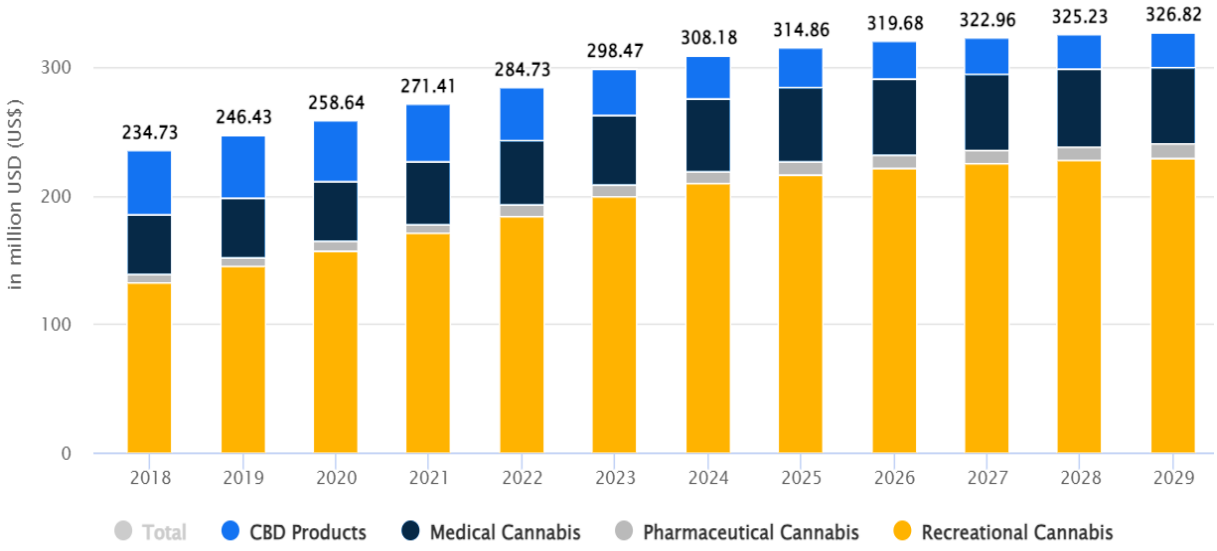

Figure 9: Cannabis Revenue Projections for South Africa (Statista Market Insights 2023)

Cannabis revenue is generated through numerous value-chain networks that have developed rapidly since the Constitutional Court ruling. These include legal sales through licensed dispensaries and retailers, cultivation and production by licensed growers who cultivate the cannabis plants followed by processing into dried flower, oils, tinctures, edibles, and various other products. The local economy also benefits from tourism activities with guided tours of cultivation facilities, cannabis-friendly accommodations, and consumption lounges as well as the export of cannabis and cannabis-derived products. Additionally, companies offering value-added services such as product testing labs, warehousing, packaging, product transportation, and consulting likewise contribute to the revenue ecosystem revenue (Statista 2023). According to Cliffe Dekker Hofmeyr Attorneys (2024), the

government collects sales tax, excise tax, and licensing fees from cannabis businesses that go into the National Treasury.

The global context similarly projects a demand increase, given the shift in commercialisation strategies and cannabis legalization for medical or recreational use across more states and countries offering a well-regulated and structured industry that allows businesses to operate legally (Mordor Intelligence 2023). According to Giadha *et al*. (2022) the sales of high-THC cannabis through legal regulated markets totaled $23.7 billion in 2020 with an estimated consumer spent of $415 billion on high-THC cannabis and cannabis products (i.e., illicit and legal spending combined) and a projected annual spending of $496 billion by 2025 as shown in figure 10 below.

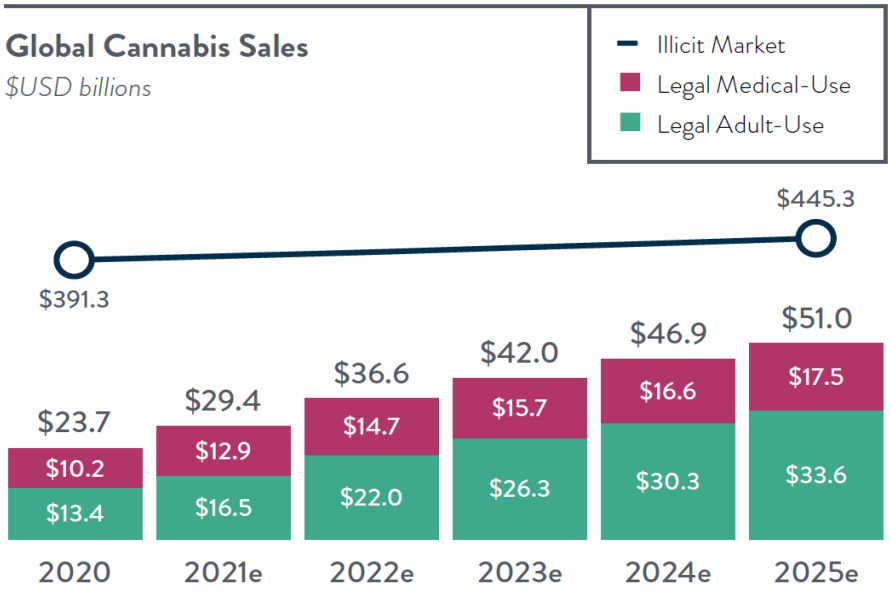

Figure 10: Global Cannabis Sales ((New Frontier Data 2022)

The full legalization of cannabis seems an inevitability for most countries, the onus lies with policymakers/regulators to absorb the recommendations of economists, healthcare professionals, patients, and the public opinion at large that Cannabis and CBD need to be legalized and regulated for the benefit of all. Giadha *et al*. (2022) argue that since 2019, the global cannabis value chain has undergone a dramatic change in liberalization, normalization, and commercialisation and that the growing acceptance of the plant's therapeutic value, and recognition of the industry's potential as a catalyst for economic growth have accelerated the growth of this market.

Chapter 3: Research Design and Methodology

The design and methods used in the research are discussed in this chapter. It illustrates the research design, instruments used, and the sampling methods incorporated to assist in the analysis of collected data.

3.1 Research Methods

The research methodology details how the study was carried out. According to Sarantakos (1998), the concept refers to the systematic process of gathering, examining, and interpreting data, along with the relevant contexts and procedures being investigated.

The qualitative method was best suited for this research because it assisted the researcher in breaking ground on this topic that has limited literature (Saunders, 2019). The method also provided a platform to identify new opportunities, concepts, and theories to close the existing gap in the commercialisation of cannabis in South Africa (Leedy & Ormrod, 2019).

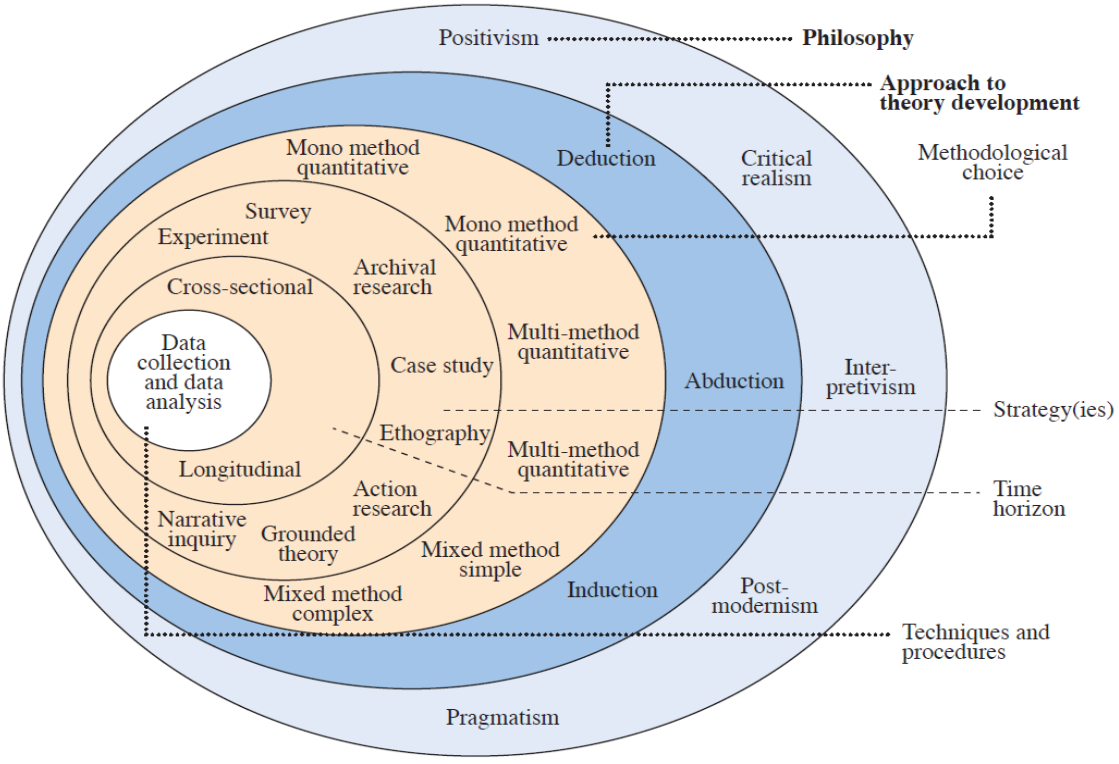

Figure 11: The research 'onion' (Saunders, et al., 2019)

3.2 Research Design

According to Saunders, a research design is defined as the general plan that will be used to answer the research question (Saunders *et al*. 2019). As previously highlighted, the critical question of this research aimed to explore the strategic interventions required to ensure that South Africa is aligned with the regulatory, social, economic, and knowledge base needed for effective cannabis commercialisation. To this end, the research followed a qualitative method as the main data collection process using existing literature and open-ended interviews.

The research adopted the Wengraf (2001:63) "CRQ-TQ-IQ (critical research question-theory question-interview question) pyramid model" as in figure 12 below. This model relates the "progression from the Central Research Questions (CRQ) differentiated into several Theory Questions (TQ) and the particular Interview Questions (IQ) and the non-verbal Interview Interventions (II)" (Wengraf, 2001). The literature review and interviews were chosen because they create a platform for clarity that provided detailed information, especially in the case of this study where there is limited literature on the commercialisation of the cannabis market (Dudovskiy, 2019).

3.3 Research Instruments

The data for this research was collected from subject matter experts through interviews. The interviews involved open-ended questions that allowed the participants to freely express and share their knowledge, views, and experiences (Hammarberg *et al.*, 2016). The interview questions were developed using literature from journals, research papers, and reports. The questions were standardized to ensure that the participants were asked the same questions and they had sufficient understanding of each question. The 'pyramid model of interview research', as outlined in Wengraf (2001:63), was used as "it explores information from the interviews and classifies it into parts of evidence that were used to answer the research objectives." (Wengraf, 2001:72)

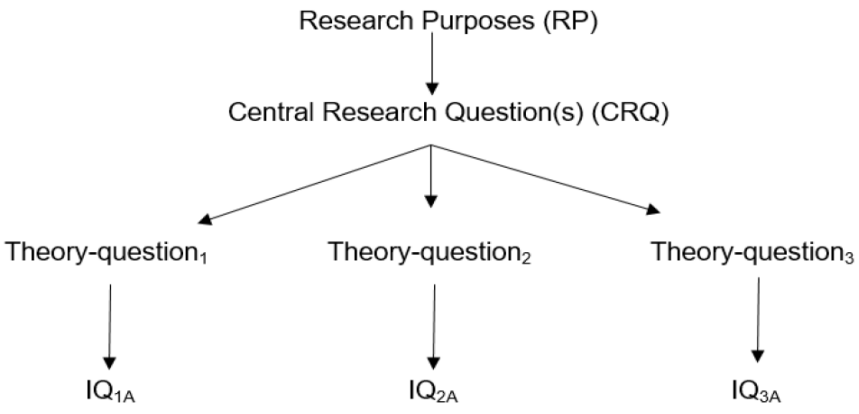

Figure 12: CRQ→TQ→IQ Pyramid Model (adapted from Wengraf, 2001)

The initial interview questions were developed from data collected from the literature review. They were used to give guidance as to which critical questions must be answered or addressed by the experts first (Leedy & Ormrod, 2019). The initial questions assisted in developing a structure for the interview questions. The participants were asked about the cannabis value chain, its regulatory and market attributes, as well as their thoughts and opinions on how to create and improve investment, research, and development needs that could aid in the effective commercialisation of the cannabis industry in South Africa.

The interviews were recorded and notes were taken for transcription and backup. The participants were asked for consent before the recording commenced. Pseudonyms were allocated to participants to ensure that their right to privacy was respected. The conversations did not proceed where any of the participants experienced discomfort during the interview (Hammarberg *et al.*, 2016; Saunders, 2019).

To answer the research question of this study, the researcher formulated several structured open-ended questions to gather information as shown in Table 2 below. The questions measured the interviewees' plain views regarding the state of the cannabis market.

Table 2 of the research and interview question framework illustrates how each component of the model sequentially flows, rendering the analysis of data more manageable through the "RP→CRQ→TQ→IQ/II sequence" (Wengraf, 2001).

Table 1: Research and interview question framework

Research Purpose (RP)	Critical Research Question (CRP)	Theory Questions (TQ)	Interview Questions (IQ)
To evaluate the prospective value chain, market accessibility, and commercialisation of cannabis in emerging markets.	What strategic interventions are required to ensure that South Africa is aligned with the regulatory, social, economic, and knowledge base needed for effective commercialisation of the cannabis market?	1. What factors that can be implemented to facilitate an increase in investment, research and technology, and product development within the cannabis industry to ensure effective commercialisation? 2. What are the regulatory and market attributes across the cannabis value chain? 3. Is there an existing framework for the cannabis value chain?	The cannabis industry is growing rapidly, with global sales expected to reach $33.6 billion by 2025. IQ-1: How do you think entrepreneurs can participate and add value to the market in order to reap the benefits of this projection? IQ-2: What does the cannabis value chain entail? And what sort of products can be achieved from its cultivation? IQ-3: Is this market easily accessible to aspiring growers? The National Cannabis masterplan challenges current regulations arguing that an appropriate policy framework and new legislation to regulate the commercialisation of cannabis should be developed.

			IQ-4: In your view, are the regulations around cannabis justifiable and well implemented? IQ-5: Would we benefit from the regulations being revised? IQ-6: What is SAHPRA's role in the industry?
			IQ-7: With cannabis being discussed on a global scale and interest in the plant growing exponentially, what is it that needs to be done to ensure that role players work towards developing a path forward for the industry that satisfies a broad range of stakeholders?
			IQ-8: What are the risk factors to consider when entering this market?
			IQ-9: In your experience, is there sufficient knowledge and expertise to drive effective commercialisation?
			IQ-10: The cannabis industry is extremely complicated, capital-intensive, and difficult to navigate, are you of the opinion that entrepreneurs will have the resilience to participate in this industry and anticipate how the industry will evolve?
			IQ-11: The South African government is making slow progress to develop the cannabis industry. Do you think the Cannabis Master Plan could serve as an effective model for other emerging cannabis economies in Africa and across the globe?
			IQ-12: Could big pharmaceutical companies assist in leading local cannabis research initiatives? And could this collaboration fast-track the government implementation of an "open market"?
			IQ-13: What supply chain elements would you say need development to ensure an industry that can truly come online and realize its potential?
			IQ-14: What types of businesses are involved in the cannabis industry, and where do the potential opportunities lie for investors and entrepreneurs
			IQ-15: Africa is widely known as a cannabis country, is that a strength or weakness? And how did that happen?

			IQ-16: What is the appetite of Investors in South Africa and what kind of businesses are they more likely to be interested in?
			IQ-17: What are the opportunities for South Africa in the cannabis space?
			IQ-18: In your opinion, how important is self-regulation, and self-management in ensuring that correct processes are in place to build investor confidence?
			Commercialisation of agricultural products is one of the most complex aspects of the agricultural production system that needs to meet increasingly stringent demands of the global, regional, national, and local markets. IQ-19: What is needed to make the commercialisation of cannabis successful (investment, infrastructure, etc.) IQ-20: And where are those opportunities for people to exploit?

3.4 Sampling Methods

The research study adopted a "non-probability sampling method", also known as "purposive sampling", wherein the researcher selected participants recognized as subject matter experts to assist in achieving the research objectives (Dudovskiy, 2019). Therefore, the researcher identified and interviewed a panel of six (6) participants who are subject matter experts on cannabis and its commercialisation.

The sample for this research was made up of participants who are knowledgeable and experienced in cannabis, regulations, economic needs, and market exploration. The participants were required to have knowledge of and experience in strategic management, commercialisation, and change management. The sample included participants of diverse backgrounds, specialties, different age groups, and races to reduce biases. The participants were required to have a minimum of 10 years of experience in commercialisation, economic development, and regulatory work to ensure the reliability and validity of the data.

3.5 Data Collection and Analysis

As mentioned above, the data was collected through consented recorded open-ended interviews of the cannabis market subject matter experts. The interviews were conducted through online video meeting platforms as well as telephonic interviews. Consent was obtained from each participant before any data collection commenced and pseudonyms were assigned to each participant. An inductive content analysis method as presented by Elo and Kyngäs (2008) was used to analyse and gain more understanding of the data due to the lack of existing literature on the commercialisation of cannabis. The six phases of data analysis as described by Braun and Clark (2006:18) were incorporated in this research as they guide the researcher on the practical aspects of executing qualitative analysis. The collected data was analysed by transcribing and coding the information to identify common themes, links, and categories (Dudovskiy, 2019). Coding of the data followed the two-level approach of Braun and Clark (2006:22), once the data was coded, it was used to gain an understanding of the strategic interventions that are required to ensure that South Africa is aligned with the regulatory, social, economic, and knowledge base needed for the effective commercialisation of the cannabis market.

3.6 Validity and Reliability

It is possible for the sample/participants not to be knowledgeable about everything that is needed to be known regarding the commercialisation of cannabis. Therefore, the researcher increased validity and reduced the risk of limited data by interviewing experts from different industrial and academic backgrounds, ages, races, and locations (Honour and Valerdi 2011). The researcher also ensured the reliability of the interview questions by conducting four dummy interviews to identify any gaps before the actual interviews commenced (Honour and Valerdi 2011). These were conducted through webinars, conferences, and "open days"/ workshops relating to cannabis commercialization where the opportunity to engage key stakeholders in the industry was given. These engagements were facilitated by Industry players who are active in the cannabis sector both locally and internationally. While the stakeholders were not included as respondents, their insight assisted in restructuring some interview questions and incorporating additional aspects to the interview schedule to gain greater detail from the respondents. The results are incorporated into the report as valuable insight was received which also assisted in tailoring the formal interview questions.

The interview questions were consistent in each interview and the participants were not pressured or influenced to answer the questions in any way that favours the researcher's opinion (Dudovskiy, 2019). Once data were collected through interviews, the recordings were shared with the interview participants to ensure the recordings were a true reflection of the participant’s thoughts and opinions (Leedy and Ormrod, 2019

3.7 Ethical Clearance

Ethical protocols were followed throughout data collection. Ethical issues refer to “general agreements shared by the researcher about what is proper or improper, in the conduct of scientific inquiry” (Babbie, 1998) Ethical clearance was obtained from the University before the commencement of the research. The clearance was an important part of the research as it ensured that the research was conducted ethically and responsibly, that the dignity, confidentiality, and safety of all participants was preserved to minimize the risk of harm, and to ensure that the findings of the research were valid and obtained with integrity.

Chapter 4: Data Analysis and Results

This chapter is a presentation of the data analysis and the findings. The respondents' responses are summarised in table format throughout for simplicity and to preserve the anonymity of participants as effectively as possible.

4.1 Participant Profiles

All the participants were South African experts, some with international experience in the cannabis trade and regulatory markets. Each participant has played a crucial role in assisting the South African Government to implement reforms that will lead to the establishment of a thriving cannabis economy. The choice to interview 6 participants was due to limited access to experts, finance, and time constraints of this research. The profile of each participant is summarised in Table 1 below.

Table 2: Participant Profiles

Interviewee	Experience	Profile
I-1	20 years in cannabis	CEO of cannabis business
I-2	14 years in Education & cannabis research	Cultivator & Lecturer
I-3	12 years in Medicine	Pharmaceutical Cannabis
I-4	15 years in Law	Regulations Specialist
I-5	20 years in cannabis	Director – own cannabis brand (seed-to-sale)
I-6	10 years in cannabis development	Agro-processing Economist

4.2 Applied Data Analysis

In this research study, interviews were adopted as the primary source of data collection. The data was organised and displayed sequentially into categories, and in table format for ease of understanding. Before concluding the qualitative research, the data was interpreted and analyzed to form the characteristics used to conclude. The researcher obtained data from six participants deemed to be subject matter experts in the cannabis market through consented recorded open-ended interviews. The participants who were interviewed were chosen using a "non-probability sampling method", also known as "purposive sampling".

Informal discussions were held with the participants before the interviews to ensure that a clear understanding of the objectives and the importance of their participation was established. The responses, although diverse, maintained a common theme and agreement. Following each interview, the researcher re-played the recorded discussions to extract additional notes from the participant's responses for further analysis. The questions were categorised into four themes and classified according to regulatory, economic, knowledge, and social. The questions sought to ascertain thoughts on the

‘development of cannabis in emerging markets- evaluating the prospective value chain, market accessibility, and commercialisation’.

4.3 Data Presentation

This chapter explains the research components concerning the study. The respondents’ responses were narrowed down into common thoughts/themes to appreciate their meanings. Table 3 below is a summation of participants' responses to the interview questions. The summary of results is derived from sub-themes as illustrated in Appendix C – Table of Sub-Themes, which were used to narrow the main themes into more detailed aspects, systematically analyze the qualitative data, and uncover meaningful insights

The table is used to illustrate the data simplistically, and holistically where an abstract of the collective responses is presented. The data is summarised to maintain the privacy and ethics of the study as the participants requested anonymity.

Table 3: Data Summation

Interview Questions (IQ)	**Summation of participant responses**
IQ-1	The vast value chain offered by cannabis opens entrepreneurship opportunities for various markets. What is required is a commitment to understanding the cannabis landscape and a willingness to learn. Collaboration with investors has become possible with the increasing possibilities being widely discussed
IQ-2	The value chain includes activities of cultivation, distribution, processing, and consumer products. If the focus is on cultivation, the regulations related to it must be well understood and met. It is the most important aspect of the value chain as it affects the quality of products produced. The cannabis products that can be cultivated include seeds harvested from the female hemp plant, fiber/stalks used for building materials, paper and textiles, and drug-type cultivars specifically for their psychoactive and therapeutic cannabinoids (commonly associated with recreational and pharmaceutical use).
IQ-3	The market itself although growing is not easily accessible to startup companies without financial support, there are cost implications to obtaining a legal license and these include having off-take agreements in place (for export), a secure location approved by the Health Regulator.
IQ-4	The various departments focusing on the regulation of cannabis cultivation, possession, and use are not aligned leading to ambiguity and incorrect arrests as evidenced by several case files. Therefore, the implementation remains in its infancy and is not fully justifiable based on the inconsistencies in current policies
IQ-5	South Africa would benefit from policy revision, and this will increase investor confidence in the sector
IQ-6	The South African Health Products Regulatory Authority (SAHPRA) is an entity of the National Department of Health, created by the South African government to ensure effective regulation of health products and the licensing of manufacturers, wholesalers, and distributors of medicines. Its legislative mandate is derived from the Constitution;

	the National Health Act, 2003 (Act No. 61 of 2003); the Medicines and Related Substances Act, 1965 (Act No. 101 of 1965), and other relevant legislation, regulations, and policies. SAHPRA oversees the quality, security, and standard operating procedures relating to the cultivation of cannabis and the manufacture and use of cannabis-related pharmaceutical products for medicinal and research purposes
IQ-7	Various platforms have been established since the 2020 State of the Nation address to increase accessibility and intensify efforts of job creation and poverty alleviation. Role players need to collaborate in developing an inclusive policy that considers the needs of all stakeholders including smallholder farmers who have been cultivating cannabis for their livelihoods. Ideally, a single platform should form the basis of all regulatory requirements and inform other departments on the management of cannabis value chains
IQ-8	As with any business, regulations and policies play a vital role. The risks associated with cannabis include: navigating complex regulations that vary across different countries, access to funds or financial constraints with traditional banking institutions, increased competition and volatility in the markets influenced by supply and demand trends, and establishing strategic partnerships without sufficient information. The latter is an important risk to consider as the cannabis market receives global recognition and interest from foreign investors
IQ-9	In South Africa, unfortunately not. This is evidenced by the inability to finalise a viable Masterplan that can change the economic situation of many.
IQ-10	The various value chains of cannabis indicate a market with immense opportunities. There are initial capital-intensive activities, but the long-term results have proved to be profitable. The economic situation has forced entrepreneurs to start thinking broadly about how they can build lasting businesses, produce locally, and export their products. A surprisingly large number of entrepreneurs have shown interest in the development of the cannabis industry, and resilience does not seem to be lacking
IQ-11	Other countries are fairly well established in the cannabis sector and they rectify policy issues as they emerge. The barriers to entry in South Africa lie mainly in the Policy reforms which inhibit effective commercialisation. With effective implementation, the master plan will open an entirely new economic driver for the country
IQ-12	Yes, value chains involve diversifying portfolios, up-selling, and cross-selling across related product groups. Pharmaceutical companies with access to willing participants can assist in research initiatives to treat various ailments with cannabis. The documented findings can fast-track government implementation of an open market.
IQ-13	The stigma associated with the industry, combined with complex regulatory and legal challenges, makes it challenging to attract and retain talented workers. For production and distribution, the shortage of raw materials, such as steel and petroleum products, create a bottleneck in the cannabis supply chain, logistics/ movements of cannabis products has regulatory restrictions. Product quality has to be correct and consistent with customer requirements and distribution networks must be developed, efficient, and reliable. The cannabis industry operates within a complex regulatory framework. Businesses must stay informed about changing rules and ensure compliance. By addressing these supply chain elements, the cannabis industry can overcome challenges and unlock its full potential
IQ-14	Various businesses have shown an interest in cannabis including, pharmaceuticals, logistics, food and beverage industries, agriculture, and information technology. Opportunities in cannabis for investors and entrepreneurs spans across sectors of cultivation, technology and innovation with software data analytics, infrastructure development, export services, product development, retail and dispensary services, and health and wellness functions.
IQ-15	IQ-15: Africa has diverse agricultural potential with a rich biodiversity and historical context. As a strength, Africa's climate and fertile soil provide favourable conditions for cultivation, cannabis has been traditionally used for centuries

	for medicinal, recreational, and spiritual purposes, it presents great economic potential and can boost local economies, and there is an export market available for exploration. As a weakness, cannabis is illegal in most African Countries, and the inconsistent regulations affect investment and growth. There is a stigma associated with cannabis and drug use, this is a perception that needs to be addressed with factual submissions. Additionally, African countries lack the infrastructure for cultivating, processing, and distribution. How it happened can be attributed to traditional practices and cultural integration where cannabis is used for healing or spiritual purposes, colonial legacy as cannabis was introduced to Africa during colonial times. European powers previously promoted its cultivation for industrial purposes (such as hemp) and taxed its production. Despite the existing challenges, it can be seen as both a strength and weakness, and harnessing its strengths can lead to sustainable growth and positive impact.
IQ-16	South African investors are periodically diversifying their portfolios, exploring alternative options, and adapting to changing market dynamics. Businesses in sectors like technology, health, and sustainable development are likely to attract their interest where environmentally conscious investments are aligned with global trends
IQ-17	The cannabis industry in South Africa holds significant promise, offering various opportunities for growth, job creation, and economic development. The opportunities are available in medical cannabis, infrastructure development, housing, transportation, clothing, warehousing, and various value-added services of marketing, sales, and information technology such as tracking, product innovation, and product extracts. Realising these opportunities and potential is possible with a supportive ecosystem and overcoming the legal barriers to entry.
IQ-18	Self-regulation refers to the ability to set and adhere to ethical standards, rules, and best practices without external enforcement. This is important as it demonstrates integrity, transparency, ethics, and increases trust. Personal discipline, consistency, and accountability form part of self-management in a business. Therefore, self-regulation and self-management are crucial aspects that contribute significantly to investor confidence and businesses that prioritize these principles create a solid foundation for sustainable growth
IQ-19	This involves navigating challenges while capitalizing on the opportunities that exist. For successful commercialisation, the regulatory landscape needs to be clarified to be clear and consistent, cultivators should adhere to quality standards with sufficient testing and product certification. The distribution of cannabis should be efficient with minimum delays and reliable networks. Research of the customer base is crucial for product promotion including creating a strong brand or image that educates consumers on the benefits and responsible use of cannabis. To mitigate risk, product diversification is an added advantage
IQ-20	The opportunities exist in Medical Cannabis, Hemp, distribution, retail markets, fuels, oils and oil extracts, and industrial products such as vehicle parts, coatings, bio-plastics, and lubricants. Personal Hygiene products, textiles (ropes, nets, slings), and clothing can also be developed

Chapter 5: Discussion

In this chapter, the findings of this study are discussed with the use of relevant literature. The major themes outlined in this chapter relate to commercialisation, knowledge, and regulatory framework.

5.1. Findings related to the Commercialisation Theme

Commercialisation relates to the introduction of new products and/ or services to the market to achieve commercial success. Its function includes activities of "production, distribution, marketing, sales, and customer support". The cannabis industry has exhibited rapid growth year on year, from 2020 to 2022, the number of countries that have legalized some form of cannabis increased from 50 to 70, with over 10 countries legalizing it for adult use, this is approximately a twofold increase from 2019.

Based on the expert interviews, the common understanding is that due to the reliance of many countries on single industries or commodities, such as mining or agriculture the development of a thriving cannabis industry can diversify economies and reduce single sector reliance. This will make the economy more resilient and better able to withstand economic downturns or shifts in demand. The panel views commercialisation and cannabis legalization as an economic opportunity, generating jobs, tax revenues and providing a boost to related sectors. South Africa can be a major exporter of cannabis and cannabis-derived products as the international demand for medicinal cannabis and hemp continues to grow. According to Prohibition Partners (2021, p26), there are "export market opportunities in medical cannabis, which is an advanced, technology-intensive form of high-value horticulture."

The respondents agreed that commercialization aims to achieve commercial success for the new product or service and that for the potential product to be eligible for commercialisation, research and development (R&D) efforts must demonstrate public value that can potentially yield profits. However, South Africa faces classic 'latecomer' challenges in achieving competitiveness in the global cannabis industry compared to the European, Israeli, and North American businesses (Malerba and Lee, 2021). The country's master plan for cannabis includes support for research and development programs across the entire value chain. According to the National Cannabis Master Plan (2021), the Research Development and Innovation (RDI) pillar of the master plan is led by the Department of Science and Innovation (DSI) which facilitates various flagship projects on medical cannabis and has been funding these studies since 2015. The plan further states that the African Medicines Platform of the Indigenous Knowledge-Based Bio-Innovation Programme coordinates the medical Cannabis RDI initiatives. This programme constitutes signatories from science councils, universities, partner government departments, traditional health practitioners (THPs), and rural and township small-medium enterprises. The programme aims to support research and development programmes for the South African cannabis industry and initiatives with national knowledge production, clinical research, product development, SMME support, and commercialisation across the entire value chain.

Additionally, the respondents argued that the "domestic markets could also be complementary to export market competitiveness, providing South Africa with opportunities to develop scale and capabilities prior to entering international markets". The analysis agrees that "having a significant domestic market would increase exporter bargaining power and mitigate risk". South Africa's unique context and challenges were considered by respondents however, they were of the opinion that there are some efforts that can be implemented to promote investment, research, and technological advancements in the cannabis industry. The initiatives that could be taken include:

- Facilitating market access and export opportunities as access to international markets could encourage investment in quality production and research while legal export channels attract foreign investment.
- International collaboration with other countries for joint research projects, knowledge exchange, and sharing of expertise can accelerate progress and lead to breakthroughs in innovation
- Education and training programs through workshops, seminars, and online courses can disseminate information about best practices, technological advancements, and improve the skills and knowledge of farmers, scientists, and entrepreneurs.
- Protection of innovations through an intellectual property framework where patent systems and licensing agreements are used to incentivize technology development.
- Investment in infrastructure, laboratories and testing facilities, and production centers to enhance research capabilities for cannabis cultivation, processing, and distribution.
- Universities and Research Institutions can form partnerships with industry players to accelerate scientific discoveries. The joint research projects can address various aspects, including cultivation techniques, medicinal properties, and sustainable practices.
- The government can encourage academic institutions and private organizations to explore cannabis-related topics through government-funded research grants with tax incentives or subsidies for research and development (R&D).

Consequently, the challenges to commercialisation are acknowledged and there are great expectations for the contribution that a legal cannabis industry can make to inclusive economic development in South Africa. By addressing these aspects, South Africa can create an environment conducive to cannabis commercialization, investment, research, and technological growth

5.2 Findings related to the Cannabis Knowledge Theme

While there are significant potential opportunities for emerging supplier nations, realizing such opportunities will not be an easy task. Entrepreneurs need to be educated on the cannabis market, domestic and international trends, financial implications of cultivating the plant, and the associated risks. The criminalization of cannabis prohibits access to knowledge and data. Research institutions maintain their findings are private and licensed producers are subjected to non-disclosure agreements. With limited access to knowledge experts and published resources, matters relating to sales data, market access, and active stakeholders (cultivators, investors, and government entities) remain inaccessible.

Historical stigma and public perception of cannabis in its entirety remains a challenge, and people need to be educated on the health benefits of cannabis and its responsible use. The South African government has endorsed a "Cannabis Institute" that allows individuals to acquire skills and the creation of occupational career paths within the emerging Cannabis sector. They offer courses related to the value chain, from cultivation to medical practitioners, as well as consumer education with the aim of "addressing the skills gap within industry particularly in the AgriSETA Sector". In addition to that, "The Cannapreneur Internship Program, was established and designed to provide opportunities to Learners completing the National Certificate in Cannabis Plant Production", amongst other social equity initiatives.

Analysis of the expert interviews highlighted that there was a knowledge gap within the cannabis value chain. Aspiring entrepreneurs, cultivators (traditional growers / small-scale farmers), and most concerning policymakers have tunnel vision of cannabis and its value chain, this inhibits exploration of the plant in its entirety. This creates clear barriers to entry as the policymakers fail to reform the regulations, entrepreneurs face various market entry challenges, and traditional growers face "multiple obstacles to their participation in the formal hemp and medical cannabis industry".

Sufficient knowledge of the cannabis plant, its benefits, and its value chain can change the trajectory of the market and enhance the collaboration of stakeholders to increase commercial success and global competitiveness.

5.3 Findings related to the Cannabis Regulatory System

South Africa's diverse climate and fertile soil provide favorable conditions for cannabis cultivation. As cannabis regulations evolve across the globe, South Africa continues with the legal hurdles of policy uncertainty. The private use of cannabis has been decriminalized, yet commercialisation remains complex due to varying interpretations of the law. According to Howell *et al.*(2024), the policy changes parallel global reforms; however, the specific dynamics and nuances of cannabis policy in Africa remain

distinctive and largely under-researched. South Africa's cannabis policy evolution has been characterized by significant shifts, particularly following the Constitutional Court ruling (2018) and the passing of the Cannabis for Private Purposes Bill (2024). The legal framework is marred with ongoing debates concerning the extent and nature of cannabis regulation and yet the framework remains complex.

The respondents agreed that each country implements "regulatory structures and societal norms" that vary greatly, necessitating a "nuanced approach to quantifying, qualifying, and understanding" the legal frameworks that govern the value chain of cannabis, from seed to consumption. Whilst other countries have seen successful implementation of Cannabis regulations, Licensing, and Quality control measures, South Africa remains a late adopter in the market. The legal uncertainty impacts market accessibility, investor confidence, and the ability to fully explore the potential of cannabis.

The structures responsible for establishing a regulatory framework include the South African Cabinet, the South African Health Products Regulatory Authority (SAHPRA), the Department of Health, Justice and Correctional Services, and the Department of Agriculture, Land Reform and Rural Development (DALRRD) amongst others. These structures have their defined objectives and mandate, they should collaborate in establishing a regulatory framework that is applicable and beneficial to the South African landscape. A joint commitment to commercializing cannabis laws will ensure that structures agree and are aligned with the vision of economic recovery through cannabis exploration.

The strategic interventions that can facilitate the establishment of a regulatory framework that is accessible to all stakeholders, ensures safety and quality are prioritized, and is economically viable requires consideration of several factors such as:

- Involving industry stakeholders, community forums, and healthcare professionals, in formulating the framework
- Development of policies that are inclusive, diverse, and grant fair access to the cannabis market
- Extending technical support to businesses to enable them to navigate the compliance, operational, and marketing complexities and enhance business viability
- Redefine, simplify, and establish clear channels for licensing approvals and product approvals

The South African Health Products Regulatory Authority (SAHPRA 2024) presented the below strategic interventions:

- The Department of Agriculture, Land Reform and Rural Development (DALRRD) should develop and implement the "Good Agricultural Cultivation Practice" standards, applicable to all permit holders for the cultivation of cannabis
- Reporting procedures need to be developed to record cannabis cultivated in South Africa

- Appropriate measures need to be taken by the National Department of Health, to regulate cannabis-derived products intended for human ingestion or other use, except for medicinal purposes

These interventions are supported by Howell *et at.* (2024) who studied the changing legislative context of cannabis and proposed

- A cohesive and cooperative approach to developing policies where the various stakeholders (industry, law enforcement, and the local communities) collaborate with the regulatory bodies in developing and implementing effective policies.
- Addressing public health as a concern as no clear planning exists from the structures responsible for public health
- The impact of cannabis legalization requires comprehensive research that will address social effects, public health implications, environmental and economic impacts
- Public and private investment will support informed policymaking and help address the challenges associated with cannabis regulation.
- Benchmarking with other countries that have experienced cannabis policy reform can provide notable lessons regarding effective regulatory strategies, adopting best practices, and potential challenges

The uncertainty experienced currently is due to the different structures operating independently of each other, resulting in ambiguity, failed reforms, and stagnation in the execution of the Cannabis Master Plan and commercialisation of cannabis. International collaborations and knowledge exchange are crucial for the ongoing development of South Africa's cannabis policy, especially as it pertains to regulatory efforts and oversight by government bodies (Howell *et al*. 2024).

Chapter 6: Conclusion and Recommendations

This research aimed to address the following critical question:

What strategic interventions are required to ensure that South Africa is aligned with the regulatory, social, economic, and knowledge base needed for effective commercialisation of the cannabis market?

It is understood that commercialisation refers to bringing new products or services to the market, whilst cannabis may not be a 'new' product, its decriminalization and commercialisation has become a topic of interest. The value of cannabis is believed to be a multibillion-dollar industry.

The objective of this was achieved to satisfy the research topic, a summary of the objectives are given below

1. To analyse the framework of the cannabis value chain

The cannabis value chain is interconnected and encompasses various stages including cultivation (farming/ seed selection), distribution, processing (harvesting and extraction), and consumer products.

The cultivation involves planting, growing, and harvesting cannabis plants and South Africa has been noted as an ideal location for cultivation due to its favourable climate. According to Malerba & Lee (2021), South Africa is known for its quality cannabis products and ranks highly in technical competence and cost-effective production. The processing was discussed where after cultivation, cannabis undergoes processing to extract various components, such as CBD (cannabidiol) and THC (tetrahydrocannabinol) and manufacturers create products like oils, tinctures, edibles, and topicals. The distribution and supply chain networks to transport cannabis products from manufacturers to retailers are impacted by legalization and regulatory frameworks. Licensed retailers, dispensaries, online stores, and outlets play the role of selling cannabis products directly to consumers

Additional value-added services were discussed including sales and marketing, technology innovation, and warehousing amongst others. Research and development initiatives explore new strains, uses, and applications of cannabis such as the investment in research to replace opioids with medicinal cannabis for pain management. Giadha *et al* (2019) suggest that technology is reshaping cannabis production, leading to safer, more customized products and sustainable practices such as modern cannabis farming that integrates automation, artificial intelligence, and precision agriculture from seed to harvest, where efficiency, consistency, and quality are ensured.

Investment in the value chain, including cultivation, processing, and retail, contributes to economic growth, the South Africa's regulatory framework is evolving and still faces challenges but enabling legislation is essential to unlock the industry's immense potential.

2. To assess the regulatory and market attributes across the cannabis value chain

South Africa has the potential to become a major player in the global cannabis market. It is well positioned and has a competitive advantage of favorable agricultural conditions, innovative processes, and strict quality control requirements. The South African Health Products Regulatory Authority (SAHPRA) oversees the regulatory framework for medicinal cannabis production and export as outlined in section 2.4, page 15. This framework allows for the cultivation, manufacturing, testing, and distribution of medical cannabis, and requires adherence to rigorous quality control standards. As previously stated, the global cannabis market is projected to reach $90.4 billion by 2026 and opportunities exist throughout the value chain, hence South Africa's regulatory framework, agricultural advantages, and quality control standards position it as a promising player in the global cannabis value chain

3. To determine the factors that can be implemented to facilitate an increase in investment, research and technology, and product development within the cannabis industry to ensure effective commercialisation.

These factors were discussed in section 5.1 page 29, as well as the risks involved in cannabis commercialisation, and a holistic approach that combines regulatory support, research, technology, and strategic partnerships are critical factors for effective commercialisation of cannabis. The factors include, facilitating market access, international collaboration on knowledge sharing, education and training, intellectual property, investment in infrastructure, partnership with universities and research institutions, and government incentives for R&D.

The research discussed various aspects of the cannabis value chain and reached the following recommendations for effective commercialisation:

- A comprehensive and clear regulatory framework is the starting point. It should address licensing, cultivation, quality standards, distribution, and sales of cannabis. The framework should be aligned to best practices of the international market.
- Investment in Research & development is crucial to building a robust knowledge base, which should include studies on the entire value chain, technology advancements, market trends & activities. This can be achieved through intentional collaboration with academic institutions international partners and industry knowledge experts.
- South Africa has trade agreements with other countries, these can be leveraged, and the network used to facilitate international access & trade. Thereby positioning South Africa as a competitive player in the global cannabis market and allowing exploration of export opportunities and collaboration with other countries.

- Economic stimulation and job creation can be realized by encouraging investment in the cannabis sector, implementing tax incentives, investing in the research and development of niche products and innovations that increase competitiveness and create value for consumers.
- Social equity should be made a priority, through the creation of opportunities that include "historically disadvantaged groups, including traditional cannabis growers and small enterprises". They should have a reasonable chance to participate in the legal cannabis sector. The policies should be inclusive and diversified, therefore creating a cannabis economy that is just and equitable.
- The stigma and public perception around cannabis can be eased with transparent education and engagements on the health benefits and responsible use of cannabis & its related products.

These recommendations and strategic interventions are based on exploratory interviews, journals, and interactions with industry experts. Thorne (2024) cited Faiez Jacobs, the chairperson of Parliament's Portfolio Committee on Small Business Development who stated that "while challenges persist, South Africa's cannabis industry has immense potential and strategic efforts toward commercialisation, accessibility, and value chain development can drive its success". The legalization and destigmatisation of cannabis is central to creating a thriving commercial cannabis industry in South Africa.

References

1. Agriculture Sector Education Training Authority (AgriSETA) (2019). Annual Report 2018/ 2019. [Online], available at https://www.agriseta.co.za/downloads/AgriSETA_2018%20_19%20Annual_Report.pdf
2. Aliber, M & Hall, R. (2012). Support for Smallholder Farmers in South Africa: Challenges of Scale and Strategy. Development Southern Africa
3. Aliber, M. & Hart, T.G., (2009). Should subsistence agriculture be supported as a strategy to address rural food insecurity? Agrekon, 48(4), pp.434-458.
4. Allen R, Bhorat H, Hill R, Rooney C & Steenkamp F. 2019. Building Economic Complexity in the South African Fibrous Plant Economy
5. Allied Market Research (2021) Cannabis Food & Beverage Market. Available at https://www.alliedmarketresearch.com/cannabis-food-and-beverage-market
6. Ames, F. (1958). A Clinical and Metabolic Study of Acute Intoxication with Cannabis Sativa and Its Role in the Model Psychosis, Marijuana: Medical Papers, Reprinted from Journal of Mental Science, vol. 104, October 1958, pp. 972-999.
7. Bengtsson, M., (2016). How to plan and perform a qualitative study using content analysis. NursingPlus Open, Volume 2, pp. 8-14.
8. Braun, Virginia & Clarke, Victoria. (2006). Using thematic analysis in psychology. Qualitative Research in Psychology. 3. 77-101. 10.1191/1478088706qp063oa.
9. Bowling CM., Hafez AY. & Glantz SA. (2020) Public Health and Medicine's Need to Respond to Cannabis Commercialisation in the United States: A Commentary, Journal of Psychoactive Drugs, 52:4, 377-382, DOI: 10.1080/02791072.2020.1761040
10. Byrnes, R.M. ed. (1996). South Africa: A country study. Federal Research Division.
11. Chandrasekaran, B., Annadurai, K. and Somasundaram, E., (2010). A textbook of agronomy. New Age International Limited.
12. Clark M, Riboulet-Zemouli K (2019). Fields of Green for all: A Full-Spectrum Manifesto For Policy Reform
13. Cliffe Dekker Hofmeyr Incorporated (2024). Seeds-of-opportunity: Exploring cannabis and hemp cultivation laws in South Africa and beyond. Available at https://www.cliffedekkerhofmeyr.com/news/publications/2024/Sector/Agriculture/agriculture-aquaculture-and-fishing-alert-30-May-2024-Seeds-of-opportunity
14. Creswell, J. W. (2002). Research Design: Qualitative, Quantitative, and Mixed Method Approaches. London: Sage Publications.
15. Creswell, J. W. (2002). Research Design: Qualitative, Quantitative, and Mixed Method Approaches. London: Sage Publications.

16. Dawson, C., (2019). Introduction to Research Methods 5th Edition: A Practical Guide for Anyone Undertaking a Research Project. Robinson.
17. Delgado, C.L. (1999). Sources of growth in smallholder agriculture in Sub-Saharan Africa: The role of vertical integration of smallholders with processors and marketers of high-value-added items
18. Department of Agriculture, Land Reform, And Rural Department (DALRRD) (2018). Plant Improvement Act 11 of 2018
19. Department of Agriculture, Land Reform, And Rural Department (DALRRD) (2020). Draft National Cannabis Masterplan for South Africa
20. Development Bank of South Africa (DBSA): The economic performance of agriculture in South Africa since 1994: Implications for food security.
21. Di Stefano, G., Gambardella, A., Verona, G., (2012). Technology push and demand-pull perspectives in innovation studies: current findings and future research directions. Res. Policy
22. Drugs And Drug Trafficking Act, 1992 (Act No. 140 Of 1992). Available at https://www.sahpra.org.za/document/drugs-and-drug-trafficking-act-1992-act-no-140-of-1992/ [Accessed 13 October 2021]
23. Dudovskiy, J., 2019. Necessary knowledge to conduct a business research. Research Methodology. [online] Available at: <https://research-methodology.net/> [Accessed 27 August 2021].
24. Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing*, *62*(1), 107–115. https://doi.org/10.1111/j.1365-2648.2007.04569.x
25. Food and Drug Administration (FDA) (2020). FDA Regulation of Cannabis and Cannabis-Derived Products, Including Cannabidiol (CBD), Available: https://www.fda.gov/newsevents/public-health-focus/fda-regulation-cannabis and- cannabis-derived-products-including-cannabidiol-cbd# other cbd approved
26. Giadha A., Kagia J. and McCann M. (2019). The Africa Regional Hemp Cannabis Report: 2019 Industry Outlook. New Frontier Data
27. Giadha A., Kagia J. and McCann M. (2022). The Global Cannabis Report: 2022, Growth & trends Through 2025. New Frontier Data
28. Grand View Research Inc. (2020). Cannabidiol (CBD) Consumer Health Market Estimates and Forecasts to 2027, GVR United States.
29. Hammarberg, K., Kirkman, M., & de Lacey, S. (2016). Qualitative research methods: When to use them and how to judge them. Human Reproduction, 31(3), 498–501. https://doi.org/10.1093/humrep/dev334
30. Haslun, J. (2020) Cannabusiness innovation: opportunities, bottlenecks, and barriers. Lux Research
31. Honour, E. C., & Valerdi, R. (2011). *Advancing an Ontology for Systems Engineering to Allow Consistent Measurement*. https://dspace.mit.edu/handle/1721.1/84432
32. Huestis MA, Sampson AH, Holicky BJ, Henningfield JE and Cone E.J. Characterization of the absorption phase of marijuana smoking. Clinical Pharmacology & Therapeutics, 1992, 52: 31-41.

33. Howell S., Clarke M., Rusenga C., Klantschnig G. , Carrier N. (2024). South African Cannabis Policy: policy reform must balance public health, economic interests, and social justice.
34. Jaleta, M.; Gebremedhin, B.; Hoekstra, D. (2009). Smallholder Commercialisation: Processes, Determinants and Impact; ILRI: Nairobi, Kenya
35. Johnson, R. 2018. Hemp as an agricultural commodity. Washington, DC: Library of Congress Washington DC Congressional Research Service.
36. Johnson, R.B., Onwuegbuzie, A.J. and Turner, L.A. (2007) Toward a Definition of Mixed Methods Research. Journal of Mixed Methods Research
37. Kahan, D. (2011). Entrepreneurship in farming.
38. Kaplinsky, Raphael & Morris, Mike. (2001). A Handbook for Value Chain Research. 113.
39. Kirsten, J.F. 2010. Agro-food Value Chains in South Africa: Global challenges and structural changes. University of Pretoria
40. Kirsten, J.F. and Van Zyl, J., (1998). Defining small-scale farmers in the South African context. Agrekon, 37(4), pp.551-562.
41. Koira, A.K. (2014). Agribusiness in sub-Saharan Africa: Pathways for Developing Innovative Programs for Youth and the Rural Poor; The Master Card Foundation: Toronto, ON, Canada.
42. KPMG (2013). Agricultural food and value. Available at https://assets.kpmg/content/dam/kpmg/pdf/2013/06/agricultural-and-food-value-chain-v2.pdf
43. KPMG (2019), LS Sector CBD Outline Publication, KPMG Germany
44. La Rosa, A.D., Cozzo, G., Latteri, A., Recca, A., Björklund, A., Parrinello, E. & Cicala, G. 2013. Life cycle assessment of a novel hybrid glass-hemp/thermoset composite. Journal of Cleaner Production. 44(2013). 69-76.
45. Lash, R. 2002. Industrial hemp: the crop for the seventh generation. American Indian Law Review. 27(1): 313-356.
46. Leedy, P.D. and Ormrod, J., (2015). Practical Research: Planning and Design. Eleventh Edition. 11th ed. Essex: Pearson Education Limited.
47. Leedy, P.D., & Ormrod, J. E. (2019). Practical Research: Planning and Design (12th ed.). Pearson Education Limited.
48. Maas, G. & Herrington, M. (2006). Global Entrepreneurial Monitor Report. South African Executive report. Cape Town: The Graduate School of Business
49. Mabaya, E., Tihanyi, K., Karaan, M. & Van Rooyen, J. (eds.) (2011). Case studies of Emerging farmers and Agribusinesses in South Africa
50. Machethe, C.L., (2004). Agriculture and poverty in South Africa: Can agriculture reduce poverty. In Paper presented at the Overcoming Underdevelopment Conference held in Pretoria (Vol. 28, p. 29).
51. Malerba, F. and Lee, K., 2021. An evolutionary perspective on economic catch-up by latecomers. Industrial and Corporate Change, 30: 986–1010. https://doi.org/10.1093/icc/dtab008

52. Mark A and Joy J. (2001). Cannabis As Medicine?: The Science Beyond the Controversy. National Academies Press. pp. 15–. ISBN 978-0-309-06531-3.
53. Matebeni F and Mazibuko N. (2019). National Agricultural Marketing Council (NAMC)
54. Mboweni, T.T. (2000). A new monetary policy framework. Statement of the Monetary Policy Committee, 6 April. SARB [Web:] http://www.reserve bank.co.za/internet/publications.nsf.
55. Medical, Dental and Pharmacy Act, 1928. Available at https://www.sahpra.org.za/acts-and-regulations/ [accessed 13 October 2021]
56. Medicine and Related Substances Act, 1965 (Act No. 101 Of 1965). Available at https://www.sahpra.org.za/acts-and-regulations/ [accessed 13 October 2021]
57. Mhone, G (2000) Enclavity and Constrained Labour Absorbtive Capacity in Southern African Countries. Geneva: International Labour Office.
58. Mordor Intelligence (2023). South Africa Legal Cannabis Market - Growth, Trends, COVID-19 Impact, and Forecasts (2021 – 2026)
59. National Planning Commission (NPC) (2012): Diagnostic Overview [Online], available at https://www.gov.za/sites/default/files/gcis_document/201409/npcdiagnosticoverview1.pdf.
60. National Treasury (NT) (2019). Budget review. [Online], available at http://www.treasury.gov.za/documents/national%20budget/2019/review/FullBR.pdf
61. National Treasury (NT) (2021). Agriculture Budget review. [Online], available at http://www.treasury.gov.za/documents/national%20budget/2021/ene/Vote%2029%20Agriculture,%20Land%20Reform%20and%20Rural%20Development.pdf
62. National Treasury (2021). Operation Vulindlela. [Online[available at https://www.treasury.gov.za/Operation%20Vulindlela%20Summary%20Booklet%20March%202021.pdf
63. National Treasury (2021). Operation Vulindlela. [Online[available at https://www.operationphakisa.gov.za/Pages/Home.aspx
64. Neuman, L. (2014). Social Research Methods: Qualitative and Quantitative Approached (7th ed.). London: Pearson Education Limited. Number 119, University of South Africa.
65. Nieman, G. & Nieuwenhuizen, C. (2009). Entrepreneurship: A South African perspective.
66. Ortmann, G.F, (2005). Promoting the Competitiveness of South African Agriculture in a Dynamic Economic and Political Environment, Agrekon, 44:3, 286-320. DIO:10.1080/03031853.2005.9523714
67. Ortmann, G.F. and King, R.P., (2006). Small-scale farmers in South Africa: Can agricultural cooperatives facilitate access to input and product markets? (No. 1701-2016-139140).
68. Palinkas, Lawrence & Horwitz, Sarah & Green, Carla & Wisdom, Jennifer & Duan, Naihua & Hoagwood, Kimberly. (2013). Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research. Administration and policy in mental health. 42. 10.1007/s10488-013-0528-y.

69. Parliament of the Republic of South Africa (2024). Justice and Correctional Services Committee Concludes Public Hearings on Cannabis Bill's Broadened Scope. Available at: https://www.parliament.gov.za/press-releases/media-statement-justice-and-correctional-services-committee-concludes-public-hearings-cannabis-bills-broadened-scope?fbclid=IwAR2tiiQNi1OHTvN1sbx6y5fAJCeuajUS2s7fpOCIvfn9ZAdYOVgrY6MeIug
70. Peltzer, Karl & Ramlagan, Shandir. (2007). Cannabis use trends in South Africa. South African Journal of Psychiatry. 13. 126-131. 10.4102/sajpsychiatry.v13i4.33.
71. Pil, L. Bensadoun, F. Pariset, J. & Verpoest, I. 2016. Why are designers fascinated by flax and hemp fibre composites?. Composites Part A: Applied Science and Manufacturing. 83(2016). 193-205.
72. Piotrowski, S. & Carus, M. 2011. Ecological benefits of hemp and flax cultivation and products. Nova institute 5(2011).1-6.
73. Prohibition Partners, 2021. Global Cannabis Report: 2nd edition.
74. Raj K., and Hall, R.P. 2020. "The Commercialisation of Smallholder Farming - A Case Study from the Rural Western Middle Hills of Nepal" Agriculture 10, no. 5: 143. https://doi.org/10.3390/agriculture10050143
75. Research and Markets (2021). Global Cannabis Market by application. Available at https://www.researchandmarkets.com/reports/5263916/global-cannabis-market-by-application
76. Rodríguez Sáenz, D. 2016. Commercialisation strategies that facilitate market access for agricultural producers. Inter-American Institute for Cooperation on Agriculture (IICA). ISBN 978-92-9248-647-1
77. Roussell, A. (2012). Forensic Identification of Marijuana: Suspicion, Moral Danger, and the Creation of Non-Psychoactive THC. The. Alb. LJ Sci. & Tech., 22, p.103.
78. Saunders, M., Lewis, P., and Thornhill, A., 2019. Research methods for business students. 8th ed. Harlow: Pearson Education Limited.
79. Sarantakos, S. (1998) Social Research. 2nd Edition, MacMillan Education Australia, South Melbourne.
80. Small, E. & Marcus, D. 2003. Tetrahydrocannabinol levels in hemp (Cannabis sativa) germplasm resources. Economic Botany. 57(4). 545-558.
81. South African Health Products Regulatory Authority (SAHPRA). (2022) Cannabis Presentation Version 1. Available at https://www.sahpra.org.za/document/cannabis-presentation/
82. South African Health Products Regulatory Authority (SAHPRA). (2017) Cultivation of Cannabis and Manufacture of Cannabis-Related Pharmaceutical Products for Medicinal And Research Purposes. Available at https://www.sahpra.org.za/documents/2674952b2.44_Cannabis_cultivation_Sept17_v2.pdf.

83. South African Health Products Regulatory Authority (SAHPRA) (2024). SAHPRA Presentation on Cannabis to the Portfolio Committee for Small Business. Available at https://www.sahpra.org.za/presentations/
84. Statista (2023). Cannabis Outlook. [Online], Available at https://www.statista.com/outlook/hmo/cannabis/south-africa
85. Statistics South Africa (2020) Quarterly Labour Force Survey, (Q1). [Online], available at http://www.statssa.gov.za/publications/P0211/P02111stQuarter2020.pdf.
86. Statistics South Africa: Census of Commercial Agriculture (2017). [Online], available at http://www.statssa.gov.za/
87. Statistics South Africa: General Household Survey (GHS) (2017). [Online], available at http://www.statssa.gov.za/publications/P0318/P03182017.pdf
88. Sterling, B., Gooch, M., Mitges, G. (2018). 2018-The Year of Recreational Cannabis What Are the Risks? How Is Industry Managing Them?
89. Sylvester, G. (2018). E-Agriculture in Action: Drones for Agriculture. E-book, available at http://www.fao.org/3/I8494EN/i8494en.pdf
90. Sung, J. (2018). The Fourth Industrial Revolution and Precision Agriculture. 10.5772/intechopen.71582.
91. Thorne, S (2024). "A R28 billion game-changer for South Africa – but government dragging its feet". *BusinessTech,* published online 1 April 2024, available at https://businesstech.co.za/news/business/762883/south-africas-cannabis-sector-looks-to-prove-its-worth-to-government/
92. Tourangeau, W., 2015. Re-defining environmental harms: Green criminology and the state of Canada's hemp industry. *Canadian Journal of Criminology and Criminal Justice*, *57*(4), pp.528-554.
93. U.S. Department of Justice, Drug Enforcement Agency, Office of Diversion Control. Title 21, United States Code (USC) Controlled Substances Act. https://www.deadiversion.usdoj.gov/21cfr/21usc/802.htm. Accessed July 2021
94. Van der Werf, H.M. 2004. Life cycle analysis of field production of fibre hemp, the effect of production practices on environmental impacts. Euphytica. 140(1-2).13-23.
95. Vink, N. & Van Rooyen, J. (2009). The economic performance of agriculture in South Africa since 1994: Implications for food security. Development Planning Division Working Paper Series No.17, DBSA: Midrand.
96. Vink, N. (1993). Entrepreneurs and the political economy of reform in South African agriculture. Agrekon, 32(4): 153–66
97. Viviers, S., Van Eeden, S. & Venter, D. (2001). Identifying small business problems in the South African context for proactive entrepreneurial education. Paper delivered at the 11th Global int-Ent conference, Kruger National Park, 2-4 Jul.

98. Von Braun, J. and Kennedy, E., (1986). Commercialisation of subsistence agriculture: Income and nutritional effects in developing countries (No. 1). Washington, DC: International Food Policy Research Institute.
99. Welman, C., Kruger, F., & Mitchell, B. (2005). Research Methodology (3rd ed.). Cape Town: Oxford University Press.
100. Whitbread, Anthony & MacLeod, Neil & Mcdonald, Carine & Pengelly, B.C. & Ayisi, Kingsley & Mkhari, Jeffery. (2011). Farming Systems, Emerging Farmers and Land Reform in the Limpopo Province of South Africa. 10.1007/978-1-4020-9132-2_17.
101. World Bank (2013). Growing Africa: Unlocking the Potential of Agribusiness; AFTFP/AFTAI Report; World Bank: Washington, DC, USA.
102. World Bank (2022). Unemployment Statistics, available at https://data.worldbank.ord/indicator
103. World Health Organization (WHO) (2017). Cannabidiol (CBD) Pre-Review Report, Expert Committee on Drug Dependence Thirty-ninth Meeting: Geneva. Available: https://www.who.int/medicines/access/controlledsubstances/
104. Zuardi A. (2006). History of cannabis as a medicine: a review. Department of Neurology, Psychiatry and Medical Psychology

Appendix A: Consent Form Template

UNIVERSITY OF THE
WITWATERSRAND,
JOHANNESBURG

FORMAL CONSENT FORM

Project Title: The development of cannabis in emerging markets- Evaluating the prospective value chain, market accessibility, and commercialization

Researcher: MH Rapetsoa

Dear Participant

Thank you for accepting to participate in this study. Please complete this consent form as you see appropriate. By signing this consent form, you are indicating that you have read and understood the description of this study and that you agree to the terms as described below:

	Acknowledgment	
Terms	**Yes**	**No**
I confirm that I have read and understood the information about this study as provided in the participant's information sheet.		
I confirm that I have been given sufficient background about research and understand the objectives		
I consent to participate in the recorded interview and freely share my expert knowledge & opinion on the matter		
I understand that my participation in this research is voluntary, I am able to refuse participation and I am free to withdraw from the research at any time		
I agree that the information I provide may be treated as strictly confidential and only the research team will have access to the interview data.		
I agree to partake in related surveys/ questionnaires if applicable as well as follow-up questions that may arise from this interview		
I agree that the results of this study may be recorded in academic journals and at conferences and that I may request a report summary, which will come as a result of this study.		
I have had the opportunity to ask questions about the research and expectations of my participation.		

I understand that the data collected from my participation will be used for research purposes and I consent for it to be used in that manner.

Participant	**Researcher**
Name:	Name: Hellen Rapetsoa
Signature:	Signature: HRapetsoa
Date:	Date:

Appendix B: Participant Interview Schedule

INTERVIEW SCHEDULE

Project Title: The development of cannabis in emerging markets- Evaluating the prospective value chain, market accessibility, and commercialization

1. The cannabis industry is growing rapidly, with global sales expected to reach $33.6 billion by 2025.
    i. How do you think entrepreneurs can participate and add value to the market in order to reap the benefits of this projection?
    ii. What does the cannabis value chain entail? And what sort of products can be achieved from its cultivation?
    iii. Is this market easily accessible to aspiring growers?

2. The National Cannabis masterplan challenges current regulations arguing that an appropriate policy framework and new legislation to regulate the commercialization of cannabis should be developed.
    i. In your view, are the regulations around cannabis justifiable and well implemented?
    ii. Would we benefit from the regulations being revised?
    iii. What is SAHPRA's role in the industry?

3. With cannabis being discussed on a global scale and interest in the plant growing exponentially, what is it that needs to be done to ensure that role players work towards developing a path forward for the industry that satisfies a broad range of stakeholders?

4. What are the risk factors to consider when entering this market?

5. In your experience, is there sufficient knowledge and expertise to drive effective commercialization?

6. The cannabis industry is extremely complicated, capital intensive, and difficult to navigate, are you of the opinion that entrepreneurs will have the resilience to participate in this industry and anticipate how the industry would evolve?

7. The South African government is making slow progress to develop the cannabis industry. Do you think the Cannabis Master Plan could serve as an effective model for other emerging cannabis economies in Africa and across the globe

8. Could big pharmaceutical companies assist in leading local cannabis research initiatives? And could this collaboration fast-track governments implementation of an "open-market"

9. What supply chain elements would you say need development to ensure an industry that can truly come online and realise its potential?

10. What type of businesses are involved in the cannabis industry, and where do the potential opportunities lie for investors and entrepreneurs?

11. Africa is widely known as a cannabis country, is that a strength or weakness? And how did that happen?

12. What is the business appetite of Investors into South Africa and what kind of businesses are they more like to be interested in?

13. What are the opportunities for South Africa in the cannabis space?

14. In your opinion, how important is self-regulation, and self-management in ensuring that correct processes are in place to build investor confidence?

15. Commercialization of agricultural products is one of the most complex aspects of the agricultural production system that needs to meet increasingly stringent demands of the global, regional, national, and local markets.
    i. What is needed to make the commercialization of cannabis successful (investment, infrastructure, etc.)
    ii. And where are those opportunities for people to exploit?

Appendix C: Table of Sub-Themes

Note that participants A-F, while the same respondents, they do not correspond to the order given in table 2 of participants I-1 to I-6. They have been randomised such that participant I-1 for example could be any participant from F-A. This is to further ensure the anonymity of the respondents.

	Participants						
Interview Questions (IQ)	**A**	**B**	**C**	**D**	**E**	**F**	**Most occurring sub-themes (in order):**
The cannabis industry is growing rapidly, with global sales expected to reach $33.6 billion by 2025.							
IQ-1: How do you think entrepreneurs can participate and add value to the market in order to reap the benefits of this projection	Commitment to understanding Willingness to learn Collaboration	Collaboration	Commitment to understanding Willingness to learn Collaboration	Willingness to learn Collaboration	Commitment to understanding Willingness to learn	Commitment to understanding Willingness to learn	1. Willingness to Learn 2. Collaboration 3. Commitment to understanding
IQ-2: What does the cannabis value chain entail? And what sort of products can be achieved from its cultivation?	Cultivation Variety of Products	Cultivation Variety of Products	Cultivation Variety of Products	Cultivation Variety of Products	Cultivation Variety of Products	Cultivation Variety of Products	1. Variety of Products 2. Cultivation
IQ-3: Is this market easily accessible to aspiring growers?	No	Maybe	Yes	No	No	Maybe	1. No 2. Maybe 3. Yes
The National Cannabis masterplan challenges current regulations arguing that an appropriate policy framework and new legislation to regulate the commercialisation of cannabis should be developed.							
IQ-4: In your view, are the regulations around cannabis justifiable and well implemented?	No	No	No	No	No	No	No

IQ-5: Would we benefit from the regulations being revised?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
IQ-6: What is SAHPRA's role in the industry?	A Regulatory Authority	A Regulatory Authority	A Regulatory Authority	A Regulatory Authority	A Regulatory Authority	A Regulatory Authority	A Regulatory Authority
IQ-7: With cannabis being discussed on a global scale and interest in the plant growing exponentially, what is it that needs to be done to ensure that role players work towards developing a path forward for the industry that satisfies a broad range of stakeholders?	Collaboration Inclusivity Shared value Solutions- focused Transparency	Inclusivity Solutions-focused	Collaboration Inclusivity Solutions-focused Transparency	Collaboration Inclusivity Transparency	Inclusivity Shared value Transparency	Collaboration Inclusivity Transparency Solutions-focused	1. Inclusivity 2. Transparency 3. Collaboration 4. Solutions-focused 5. Shared value
IQ-8: What are the risk factors to consider when entering this market?	Navigating Regulations Access to funding Barriers to entry & markets Lack of sector knowledge	Access to funding Barriers to entry & markets Lack of sector knowledge	Navigating Regulations Barriers to entry & markets	Barriers to entry & markets Access to funding Lack of sector knowledge	Navigating Regulations Lack of sector knowledge	Barriers to entry & markets Lack of sector knowledge	1. Lack of sector knowledge 2. Barriers to entry & markets 3. Navigating Regulations 4. Access to funding
IQ-9: In your experience, is there sufficient knowledge and expertise to drive effective commercialisation?	Yes	Maybe	No	Maybe	No	No	1. No 2. Maybe 3. Yes

IQ-10: The cannabis industry is extremely complicated, capital-intensive, and difficult to navigate, are you of the opinion that entrepreneurs will have the resilience to participate in this industry and anticipate how the industry will evolve?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
IQ-11: The South African government is making slow progress to develop the cannabis industry. Do you think the Cannabis Master Plan could serve as an effective model for other emerging cannabis economies in Africa and across the globe?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
IQ-12: Could big pharmaceutical companies assist in leading local cannabis research initiatives? And could this collaboration fast-track the government implementation of an "open market"?	Yes	Yes	Yes	Yes	Yes	Yes	Yes
IQ-13: What supply chain elements would you say need development to ensure an industry that can truly come online and realize its potential?	Destigmatisation Policy Reforms Quality Controls	Policy Reforms Logistics/ Distribution Market adaptability	Logistics/ Distribution Market adaptability Policy Reforms	Destigmatisation Quality Controls Logistics/ Distribution	Policy Reforms Quality Controls Logistics/ Distribution	Policy Reforms Quality Controls Logistics/ Distribution	1. Logistics/ Distribution 2. Policy Reforms 3. Quality Controls 4. Market adaptability

	Logistics/ Distribution Market adaptability				Market adaptability		5. Destigmatisation
IQ-14: What types of businesses are involved in the cannabis industry? Where do the potential opportunities lie for investors and entrepreneurs?	Various Business Multiple sectors	Various Business Multiple sectors	Various Business Multiple sectors	Various Business Multiple sectors	Various Business Multiple sectors	Various Business Multiple sectors	1. Various Business 1. Multiple sectors
IQ-15: Africa is widely known as a cannabis country, is that a strength or weakness? How did that happen?	Strength Traditional Practices Cultural Integration Colonial Legacy	Strength Traditional Practices	Strength Cultural Integration Colonial Legacy	Strength Colonial Legacy	Strength Traditional Practices Colonial Legacy	Strength Cultural Integration Colonial Legacy	1. Strength 2. Colonial Legacy 3. Traditional Practices 4. Cultural Integration
IQ-16 – i: What is the appetite of Investors in South Africa?	Sufficient	Relatively Good	Good	Good	Good	Sufficient	1. Good 2. Sufficient 3. Relatively Good
IQ-16 – ii: what kind of businesses are they more likely to be interested in	Dependent on the business's long-term strategy	Pharmaceutical	Technology	Dependent on the business's long-term strategy	Dependent on the business's long-term strategy	Technology	1. Dependent on the business's long-term strategy

							2. Technology 3. Pharmaceutical
IQ-17: What are the opportunities for South Africa in the cannabis space?	Vast Array of opportunities	Vast Array of opportunities	Vast Array of opportunities	Vast Array of opportunities	Vast Array of opportunities	Vast Array of opportunities	Vast Array of opportunities
IQ-18: In your opinion, how important is self-regulation, and self-management in ensuring that correct processes are in place to build investor confidence?	Crucial	Very Important	Critical	Crucial	Crucial	Crucial	1. Crucial 2. Critical 3. Very Important
Commercialisation of agricultural products is one of the most complex aspects of the agricultural production system that needs to meet increasingly stringent demands of the global, regional, national, and local markets.							
IQ-19: What is needed to make the commercialisation of cannabis successful (investment, infrastructure, etc.)	Clear Regulations Adherence to Quality Controls Credible networks Product innovation	Clear Regulations Adherence to Quality Controls Credible networks Market research	Clear Regulations Credible networks Product innovation	Clear Regulations Credible networks Product innovation	Clear Regulations Product innovation Market research	Clear Regulations Adherence to Quality Controls Credible networks Product innovation	1. Clear Regulations 2. Product innovation 3. Credible networks 4. Adherence to Quality Controls 5. Market research
IQ-20: And where are those opportunities for people to exploit?	Across various sectors	Across various sectors	Across various sectors	Across various sectors	Across various sectors	Across various sectors	Across various sectors