

LSF Case Study

Prepared by Zageta Solutions

March 2026



# South Africa's Industrial Hemp Value Chain Development Study



---

## DISCLOSURE

---

This study provides an evidence-based assessment of South Africa's hemp industrialisation opportunities and challenges through a whole value-chain approach. The study draws on qualitative and quantitative analysis through the lens of economic complexity, segmentation, stakeholder assessments, the 5F framework and localisation to understand hemp's technical and economic feasibility and map current industrial capabilities and capacities for the sector. The study analyses current global and local market dynamics, supply and demand drivers, and the prioritisation of key demand pathways to design policy enablers for future implementation. The findings show that hemp can support climate-resilient industrialisation, expand agro-processing, and localise value chains. However, progress is constrained by regulatory fragmentation and capability gaps. The report provides a clear evidence base for more coherent reforms, targeted industrial policy and positions hemp as an enabling crop to meet broader industrialisation objectives in South Africa.

---

## ABOUT LSF

---

The Localisation Support Fund NPC ("LSF") was established as a non-profit company in 2021, funded by private sector contributors committed to localising manufacturing in South Africa. The LSF is a network orchestrator within the localisation ecosystem facilitating the connection between supply and demand participants, enhancing the value of the interactions by funding industry research and the deployment of technical expert resources to accelerate or unblock opportunities for localisation and growth in the manufacturing sector.

---

## ABOUT SERVICE PROVIDER

---

Zageta Solutions Pty Ltd was founded in 2018 primarily as the first hemp and cannabis advisory business in South Africa specifically and more generally committed to innovating solutions to intractable problems across the industrial policy and commercial sustainability space. The company aims to be a trusted partner to governments, private sector, and other organisation by providing world class research and analytical capabilities and access to specialist and international expertise. The Zageta Project team and authors includes M. Ayanda Bam, Andrew Murray, Sibongile Martino, Dr Claudia Beck-Reinhardt, Rebecca Bank and Kaeden Arnold. This paper's research and findings were completed in partnership with the Development Policy Research Unit (DPRU) at the University of Cape Town, under the leadership of Professor Haroon Bhorat, Dr Francois Steenkamp, and Robert Hill .

---

## DISCLAIMER

---

This report has been prepared in fulfilment of a study to complete a value chain analysis of the industrial hemp sector and illustrate the local manufacturing capability of all components used in this value chain. This is the final report and captures the detailed demand-led analysis as well as the manufacturing capability assessment in conformance with the objectives of the report. There may be products, manufacturers, suppliers, and other stakeholder information missing in the report and this is not intentional or meant to prejudice anyone.

LSF or any of their respective, affiliates, representatives, partners, directors, officers, employees, advisers or **agents ("Representatives")** do not accept any liability or responsibility for the accuracy or

completeness of or makes any representation or warranty or gives any undertaking, express, implied or tacit, with respect to the information and any opinions contained in this report or information on which this report is based or with respect to any other information or opinion made available or to be made available, whether in written or oral or other format, to any recipient. The recipient will be liable for forming their own views as to the accuracy and completeness of the information.

To the fullest extent permitted by law, in no circumstances will the LSF and/or Representatives be responsible or liable for any direct, indirect or consequential loss or loss of profit arising from the use of this report, its contents, its omissions, reliance on the information contained within it or on opinions communicated in relation thereto or otherwise arising in connection therewith.

The report has not been independently verified by LSF and/or its Representatives. LSF and/or its Representatives does not undertake or expect to update or otherwise revise this report and expressly disclaim any obligation to disseminate any updates or revisions, including to any financial data or forward-looking statements, that may result from any change expectations, conditions or any other events or circumstances arising after the date of this report.

The information includes forward-looking statements which include, without limitation, any statements preceded by, followed by or including words such as “target”, “objective”, “believe”, “expect”, “aim”, “intend”, “may”, “anticipate”, “estimate”, “plan”, “project”, “will”, “can have”, “likely”, “should”, “would”, “could” and other words and terms of similar meaning or the negative thereof.

The forward-looking statements in the report are based on beliefs and projections and on information currently available to them; however, these forward-looking statements are subject to risks, uncertainties and assumptions. Should risks or uncertainties materialise, or should any underlying assumptions prove to be incorrect, the actual financial conditions or results of operations could differ materially from those described herein as anticipated, believed, estimated or expected. No representation or warranty is made that any forward-looking statement will come to pass. No one undertakes to update or revise any such forward-looking statement.

---

## **DISCLOSURE**

---

This research was commissioned by the LSF and was conducted independently by Zageta Solutions. The lead consultant responsible for this report, as well as the overall project, is M. Ayanda Bam. The opinions or recommendations contained in this report represent the views of the authors and do not necessarily reflect the views and opinions of the LSF.

This report is addressed to the LSF solely for its use and benefit for purposes of the value chain mapping study, and may not be transmitted to any other person, or quoted or referred to in any public document, or filed with any governmental agency or person without the LSF’s prior written consent.

Unless otherwise agreed to by the LSF in writing, no person, other than the LSF, is entitled to rely on this Report and LSF shall have no responsibility or liability to any party who has access to this report, whether in contract, delict (including gross negligence) or otherwise.

---

## **COPYRIGHT**

---

@2026. All rights reserved. This document is copyrighted to the LSF. Prior written permission must be obtained before using this report.

# Content

|   |     |
|---|-----|
| 1. Executive Summary .....                            | 12  |
| 2. Introduction .....                                 | 24  |
| 3. Ch 1: What is Hemp .....                           | 29  |
| 4. Ch 2: Value Chain Assessment .....                 | 39  |
| 5. Ch 3: Demand Assessment .....                      | 82  |
| 6. Ch 4: Priority Demand Pathways.....                | 103 |
| 7. Ch 5: The Financial Case for Hemp.....             | 125 |
| 8. Ch 6: Industrial Enablers and Recommendations..... | 160 |
| 9. Conclusion .....                                   | 190 |
| 10. References.....                                   | 193 |



# Tables

|  |     |
|--|-----|
| <i>Table 1: Regulatory Distinctions</i> .....  | 30  |
| <i>Table 2: Imports of hemp and alternative fibres and yarns, 2010 to 2023</i> .....                   | 94  |
| <i>Table 3: Value and share of retail sales by industry, 2010-2024</i> .....                           | 95  |
| <i>Table 4: Value and share of manufacturing sales by industry, 2010-2024</i> .....                    | 96  |
| <i>Table 5: Back-of-the-envelope hemp potential market sizing</i> .....                                | 98  |
| <i>Table 7: Hemp products versus all products, by community</i> .....                                  | 110 |
| <i>Table 8: Frontier hemp products versus general frontier products</i> .....                          | 111 |
| <i>Table 9: Frontier hemp products by end-product category</i> .....                                   | 112 |
| <i>Table 10: Priority Demand Pathway Prioritisation Indices</i> .....                                  | 119 |
| <i>Table 11: Hemp Cultivation - Land Preparation Costs and Assumptions - Soil Amelioration</i> .....   | 129 |
| <i>Table 12: Hemp Cultivation - Land Preparation Costs and Assumptions - Weeding</i> .....             | 130 |
| <i>Table 13: Hemp Cultivation - Land Preparation Costs and Assumptions - Tilling, Discing</i> .....    | 130 |
| <i>Table 14: Sowing Density, Yield, and Price Ranges for Various Hemp Crop Varieties</i> .....         | 131 |
| <i>Table 15: Hemp Cultivation - Planting Costs for Fibre and Dual Crop and Assumptions</i> .....       | 132 |
| <i>Table 16: Hemp Cultivation - Input costs Fertigation</i> .....                                      | 133 |
| <i>Table 17: Hemp Cultivation - Fertiliser Application Costs</i> .....                                 | 133 |
| <i>Table 18: Hemp Cultivation - Harvesting Costs for Fibre and Dual Crop</i> .....                     | 134 |
| <i>Table 19: Hemp Cultivation - Post-Harvesting Costs for Fibre and Dual Crop</i> .....                | 135 |
| <i>Table 20: Total specified variable and fixed costs (break-even costs), total and per unit</i> ..... | 136 |
| <i>Table 21: Fibre Crop - Returns Analysis per ha and per kg</i> .....                                 | 141 |
| <i>Table 22: Fibre Crop - Returns Comparison by scale</i> .....  | 141 |
| <i>Table 23: Sensitivity Analysis (Yield and Price) - Fibre-Only Crop</i> .....                        | 142 |
| <i>Table 24: Sensitivity Analysis (Seed Toggle) - Fibre only</i> .....                                 | 142 |
| <i>Table 25: Total specified variable and fixed costs (break-even costs)</i> .....                     | 143 |
| <i>Table 26: Dual Purpose Crop - Returns Comparison by scale</i> .....                                 | 144 |
| <i>Table 27: Sensitivity Analysis (Yield and Price) - Dual Purpose Crop</i> .....                      | 144 |
| <i>Table 28: Sensitivity Analysis (Seed Toggle) - Dual-Purpose Crop</i> .....                          | 145 |
| <i>Table 29: Estimated Cost of Fixed Assets</i> .....  | 148 |
| <i>Table 30: Hemp Processing Inputs - Selected Production Parameters and Assumptions</i> .....         | 149 |
| <i>Table 31: Hemp Straw Processing - Revenue and Cost Assumptions</i> .....                            | 149 |
| <i>Table 32: Hemp Straw Processing - Fixed and Other Costs and Assumptions</i> .....                   | 150 |
| <i>Table 33: Processed Hemp Straw Products</i> .....   | 151 |

|  |     |
|--|-----|
| <i>Table 34: Total specified variable and fixed costs (break-even costs), total and per unit</i> .....                               | 151 |
| <i>Table 35: Summary of Straw Processing Returns</i> .....   | 153 |
| <i>Table 36: Hemp Straw Processing Base IRR</i> .....  | 153 |
| <i>Table 37: Hemp Processing Sensitivity Analysis - Capex</i> .....  | 154 |
| <i>Table 38: Hemp Processing Sensitivity Analysis - Straw Price</i> .....  | 154 |
| <i>Table 39: Hemp Processing Sensitivity Analysis - Utilisation</i> .....  | 155 |
| <i>Table 40: Hemp Straw Processing - Output Price Sensitivity</i> .....  | 156 |
| <i>Table 41: Regulatory Reform Key Enablers and Recommendations - Critical Tools, Measures and Actions</i> .....                     | 171 |
| <i>Table 42: Innovative Finance Key Enablers and Recommendations - Critical Tools, Measures and Actions</i> .....                    | 172 |
| <i>Table 43: R&amp;D Key Enablers and Recommendations - Critical Tools, Measures and Actions</i> .....                               | 173 |
| <i>Table 44: Spatial and Industrial Infrastructure Key Enablers and Recommendations - Critical Tools, Measures and Actions</i> ..... | 175 |
| <i>Table 45: Farmer Development and Support Key Enablers and Recommendations</i> .....   | 177 |
| <i>Table 46: Market Development Key Enablers and Recommendations</i> .....   | 178 |
| <i>Table 47: Trade Key Enablers and Recommendations</i> .....  | 179 |

# Table of Figures

|   |     |
|---|-----|
| Figure 1: History of hemp.....  | 33  |
| Figure 2: The many uses of hemp .....   | 34  |
| Figure 3: Unique features of inflorescences .....   | 35  |
| Figure 4: Hemp and Nutrition .....  | 36  |
| Figure 5: Hemp Stalk .....  | 37  |
| Figure 6: The Wild Hemp Universe.....   | 40  |
| Figure 7: The 5Fs Segmentation .....  | 41  |
| Figure 8: A Segmented Hemp Universe .....   | 41  |
| Figure 9: Demand-led Hemp Value Chain.....  | 43  |
| Figure 10: Stages of Seed Commercialisation (High Level) .....  | 49  |
| Figure 11: Cultivation: Demand for Farm-Gate Products .....   | 57  |
| Figure 12: Snapshot of South African Hemp Permits (2022 - 2025) .....   | 60  |
| Figure 13: Maps of Hemp Production in France (left) and China (right).....  | 62  |
| Figure 14: Spatial Distribution of Hemp Farms in South Africa (2025).....   | 63  |
| Figure 15: Cultivation: How Productive Hemp Is .....  | 66  |
| Figure 16: Cultivation How Hemp Straw Differs.....  | 67  |
| Figure 17: How Hemp Straw Unlocks Value.....  | 77  |
| Figure 18 Estimated average hemp market size and growth (2025-2032).....  | 83  |
| Figure 19: Critical demand segments: revenue share by product (left) and revenue share by end-use (right).....          | 84  |
| Figure 20: Key supplier and demand markets .....  | 85  |
| Figure 21: Risks, Challenges and Opportunities.....   | 86  |
| Figure 22: Summary of data used and link to analytical lenses.....  | 93  |
| Figure 23: The relationship between economic complexity and economic development.....                                   | 105 |
| Figure 24: Stages of the frontier product approach .....  | 107 |
| Figure 25: Multiproduct value chains for hemp products .....  | 109 |
| Figure 26: Distribution of PCI for hemp products in relation to all products. ....                                      | 110 |
| Figure 27: Frontier hemp products by labour intensity .....   | 113 |
| Figure 28: Overall approach to identify strategic hemp pathways: synthesising qualitative and quantitative inputs ..... | 115 |
| Figure 29: Metrics for Qualitative Assessment .....   | 115 |
| Figure 30: Quantitative Lens of Priority Demand Pathways .....  | 116 |
| Figure 31: Metrics for Qualitative Assessment .....   | 117 |

|  |     |
|--|-----|
| <i>Figure 32: Summary of Ratings for Qualitative Prioritisation</i> .....            | 118 |
| <i>Figure 33: Synthesised View of Hemp Priority Demand Pathways</i> .....            | 119 |
| <i>Figure 34: Fibre Crop - Total Specified Costs by Production Model</i> .....       | 137 |
| <i>Figure 35: Dual-Purpose crop: Total Specified Costs by Production Model</i> ..... | 137 |
| <i>Figure 36: Hemp Straw Processing - Total Specified Costs Breakdown</i> .....      | 152 |
| <i>Figure 37: Industrial Policy Instruments</i> .....                                | 169 |
| <i>Figure 38: Summary of Industrial Policy Recommendations</i> .....                 | 181 |
| <i>Figure 39: Hemp Industrial Lifecycle Roadmap</i> .....                            | 185 |

# List of Abbreviations, Acronyms and Definitions

| Acronym/Term | Definition/Expansion  |
|--------------|---|
| AAGR         | Average Annual Growth Rate  |
| ACFTA        | African Continental Free Trade Area                                     |
| AFDB         | African Development Bank  |
| AI           | Artificial Intelligence   |
| ARC          | Agricultural Research Council   |
| BACI         | Base pour l'Analyse du Commerce International (Trade Analysis Database) |
| CAGR         | Compound Annual Growth Rate   |
| CAPEX        | Capital Expenditure   |
| CARA         | Conservation of Agricultural Resources Act                              |
| CBD          | Cannabidiol (non-psychoactive compound in cannabis)                     |
| CfPPA        | Cannabis for Private Purposes Act                                       |
| CSIR         | Council for Scientific and Industrial Research                          |
| DAFF         | Department of Agriculture, Forestry and Fisheries                       |
| DALRRD       | Department of Agriculture, Land Reform and Rural Development            |
| DFFE         | Department of Forestry, Fisheries and the Environment                   |
| DFI          | Development Finance Institution   |
| DoA          | Department of Agriculture   |
| DOH          | Department of Health  |
| Downstream   | Value chain phase for consumer-facing and end-use products              |
| DPRU         | Development Policy Research Unit (University of Cape Town)              |
| DTIC         | Department of Trade, Industry and Competition                           |
| EC           | European Commission   |
| ECRDA        | Eastern Cape Rural Development Agency                                   |
| EIHA         | European Industrial Hemp Association                                    |
| ESD          | Enterprise and Supplier Development                                     |
| ESG          | Environmental, Social and Governance                                    |
| EU           | European Union  |
| FCDAAA       | Foodstuffs, Cosmetics and Disinfectants Act, 1972 (Act No. 54 of 1972)  |
| FIHO         | Federation of International Hemp Organisations                          |
| FMCG         | Fast Moving Consumer Goods  |
| FOHSA        | Friends of Hemp South Africa  |
| FSSC         | Food Safety System Certification  |
| GAIN         | Growth and Inclusion Strategy   |

|                 |  |
|-----------------|--|
| GAP             | Good Agricultural Practice   |
| GDP             | Gross Domestic Product   |
| GMO             | Genetically Modified Organism  |
| GMP             | Good Manufacturing Practice  |
| HACCP           | Hazard Analysis and Critical Control Points                              |
| HS              | Harmonised System (for trade classification)                             |
| IDC             | Industrial Development Corporation                                       |
| IGR             | Inter-Governmental Relations   |
| Industrial hemp | Cannabis sativa L  |
| IP              | Intellectual Property  |
| IPPC            | International Plant Protection Convention                                |
| ISIC            | International Standard Industrial Classification                         |
| ITAC            | International Trade Administration Commission                            |
| ITPGRFA         | International Treaty on Plant Genetic Resources for Food and Agriculture |
| JET             | Just Energy Transition   |
| KAN             | Calcium Ammonium Nitrate   |
| KZN             | KwaZulu Natal (South African province)                                   |
| LAN             | Liquid Ammonium Nitrate  |
| LCA             | Life Cycle Assessment  |
| LP              | Limpopo (South African province)   |
| LSF             | Localisation Support Fund  |
| Midstream       | Value chain phase converting hemp biomass into input materials           |
| MSME            | Medium, Small, Micro Enterprises   |
| MT              | Metric Ton   |
| NBR             | South Africa's National Building Regulations                             |
| NBT             | New Breeding Techniques  |
| NEF             | National Empowerment Fund  |
| NEMA            | National Environmental Management Act                                    |
| NIP             | National Industrial Policy   |
| On-Farm         | Farming activity and cultivation of hemp                                 |
| PCI             | Product Complexity Index   |
| PIA             | Plant Improvement Act  |
| PMO             | Project Management Office  |
| QA              | Quality Assurance  |
| QC              | Quality Control  |
| R&D             | Research and Development   |
| RD&I            | Research, Development and Innovation                                     |
| SA              | South Africa   |
| SADC            | Southern African Development Community                                   |
| SAHPRA          | South African Health Products Regulatory Authority                       |

|              |  |
|--------------|--|
| SANS         | South African National Standards                         |
| SANSOR       | South African National Seed Organization                 |
| SARS         | South African Revenue Service                            |
| SEDFA        | Small Enterprise Development and Finance Agency          |
| SEZ          | Special Economic Zone                                    |
| SIC          | Standard Industrial Classification                       |
| Side stream  | Activity parallel to and supporting value chain phases   |
| SMME         | Small, Medium, Micro Enterprises                         |
| SPV          | Special Purpose Vehicle                                  |
| SWOT         | Strengths, Weaknesses, Opportunities, Threats            |
| THC          | Tetrahydrocannabinol (psychoactive compound in cannabis) |
| UN           | United Nations   |
| UNGC         | United Nations Global Compact                            |
| UNCTAD       | United Nations Conference on Trade and Development       |
| UPOV         | Union for the Protection of New Varieties                |
| Upstream     | Inputs for farming, seed, fertilizer, and land           |
| WIPO         | World Intellectual Property Organisation                 |
| 5F framework | Farming, Foods, Feeds, Fibres, and Fractions             |

# Executive Summary

---

## Background and Purpose

Hemp represents a transformative opportunity for South Africa to pursue climate-resilient industrialisation and build robust, localised agro-processing value chains. As a strategic resource for the 21st century, the crop aligns directly with the country's core development imperatives: industrial diversification, social inclusion, and decarbonisation. As this study estimates (see Chapter 3), domestic demand alone for hemp and hemp-derived products (including manufacturers) could be worth as much as R40 billion by 2040.

Environmentally, hemp's capacity to sequester significant volumes of carbon dioxide and regenerate soil health positions it as a meaningful enabler of the global green transition. Its commercial versatility is equally compelling - every part of the plant, from grain and flowers to stalks, yields marketable outputs spanning textiles, biodegradable packaging, nutritional superfoods, and carbon-negative construction materials such as hempcrete. South Africa holds a "late starter advantage," enabling the country to draw on its diverse agro-ecological zones, existing manufacturing infrastructure, and counter-seasonal production cycles to supply global markets on a reliable, year-round basis.

Beyond export potential, the industry offers a tangible pathway to inclusive rural economic development - creating opportunities for smallholder farmers and anchoring localised primary processing hubs. Economic complexity analysis has identified 134 frontier hemp products that South Africa is positioned to manufacture, with the potential to meaningfully enhance the nation's industrial sophistication. The 5F framework - Farming, Foods, Feeds, Fibres, and Fractions - provides the structured logic for navigating these applications, ensuring that industrial design remains grounded in market demand.

The unit economics of South African hemp (as detailed in Chapter 5 of this study) show genuine promise, and there is a credible financial case to be made on both sides of the supply chain. Cultivation is viable, with mechanised models in particular showing attractive returns; and there is meaningful room to improve those returns further through better yields, localised seed supply, and smarter mechanisation models that bring more farmers into the picture. Mid-stream processing tells a similarly encouraging story: converting raw straw into industrial feedstock unlocks substantial value for downstream manufacturers, and the study confirms this is a viable proposition for South Africa. Viability is however conditional on markets being secured, supply scaling at pace, and targeted financing instruments that make the entry costs of processing more manageable.

Currently South Africa lacks the necessary coherent plan to translate this opportunity into commercial reality - and without one, the sector's potential risks remaining theoretical. What is required is a dedicated industrial strategy that provides the regulatory clarity needed to treat hemp unambiguously as an agricultural commodity, sends consistent and credible signals to attract private investment into critical processing infrastructure, and addresses the significant knowledge gaps that persist across operators, investors, and regulators alike.

Crucially, such a strategy must resolve the sector's foundational "chicken and egg" problem - where farmers will not plant without assured markets, and processors will not invest without guaranteed supply - through deliberate, demand-led value chain coordination. Given the constraints on the national fiscus, a coherent strategy is needed which can enable policymakers to make informed choices about which demand pathways to prioritise, ensuring limited resources are deployed for maximum impact. Without this overarching framework, even well-intentioned interventions risk being fragmented and misaligned, undermining South Africa's broader goals of industrial diversification, rural inclusion, and decarbonisation.

Although the Cannabis for Private Purposes Act (CfPPA) was enacted in May 2024, full liberalisation of hemp will only be achieved once the Regulations to the Act are gazetted and cannabis is formally removed from the Drugs and Drug Trafficking Act. Until this regulatory step is completed, barriers to investment in hemp remain and the enabling environment for industrialisation is not yet fully in place.

Bridging the gap between this current legislative uncertainty and the sector's vast economic potential, this study seeks to address this gap through presenting a comprehensive, evidence-based assessment of South Africa's industrialisation opportunities in the nascent hemp industry, to explore the extent to which there is a business case for investment in the sector.

The work was commissioned by the Localisation Support Fund (LSF) in partnership with the Project Management Office (PMO) in the Office of the President of the Republic of South Africa, together with the Industrial Development Corporation (IDC) and the Department of Trade, Industry, Development and Competition (DTIC).

The study was undertaken by Zageta Solutions working together with the University of Cape Town's Development Policy Research Unit.

The project was managed by a multistakeholder steering committee, made up of LSF officials, together with representatives from the DTIC and Presidency.

The timing is appropriate as Government, through the DTIC, drives the country's Cannabis Masterplan and develops a Hemp Commercialisation Policy.

## Scope and Objectives

---

The study aims to understand the requirements for stimulating competitive, localised downstream manufacturing of hemp anchored on five "Priority Demand Pathways", and the extent to which a positive business case exists for these.

The Study is framed around **5 core objectives**:

1. To establish a common base on what hemp is (and is not), and undertake a detailed, segmented, and demand-led value chain assessment to understand the machinations of the hemp supply chain and the requirements for meeting downstream requirements.
2. To assess the shape and size of the global and domestic hemp market; How it is growing, what's driving it, how competitive it is, and which segments or Demand Pathways are most attractive.

3. To identify and prioritise demand pathways and opportunity sets in the hemp value chain with optimal prospects for achieving national goals including output growth, employment, industrial diversification, inclusion and decarbonisation.
4. To evaluate feasibility to execute in terms of requisite capabilities and enablers, and cost competitiveness in the value chain for localised downstream manufacturing, and
5. To develop a broad suite of industrial policy tools and instruments with supporting institutional arrangements to facilitate, catalyse, enhance, support, or enable the opportunities identified.

While the report does not seek to provide a comprehensive bankability assessment for specific investment opportunities, nor a detailed plan for hemp industrialisation, the study addresses information asymmetries in the hemp value chain, and seeks to direct investors to opportunity sets where there are financial and broader socio-economic returns while providing structured insights and analysis that can inform future strategy and policy development.

Crucially, the study advances a systematic, evidenced-based framework for an industrial strategy with a targeted set of policy recommendations and a phased implementation roadmap. It begins with the most fundamental requirement: establishing legal and functional clarity by separating hemp from intoxicating cannabis, treating it unambiguously as an industrial commodity. From this foundation, the 5F framework - Farming, Foods, Feeds, Fibres and Fractions - organises the entire value chain around a demand-led logic, ensuring that upstream decisions on genetics, cultivation, and processing are driven by the specific requirements of end markets rather than supply-side assumptions.

Recognising that South Africa cannot pursue every opportunity simultaneously, the framework applies a rigorous prioritisation process combining economic complexity analysis with market readiness assessments, identifying five Tier 1 demand pathways: General Textiles, Personal Care, Pulp and Paper, Food and Beverages, and Building and Construction. Central to the framework's commercial viability is its diagnosis of the "missing middle" - the absence of industrial-scale decortication infrastructure - which it identifies as the critical structural bottleneck that must be resolved before the broader value chain can be unlocked.

To address this and related constraints, the framework proposes a comprehensive industrial policy toolbox spanning both supply-side interventions (regulatory reform, a dedicated Hemp Fund, R&D, and spatial clustering) and demand-side instruments (trade rebates, investment promotion, and public procurement commitments). These enablers are then sequenced across a 20-year industrialisation roadmap, with a near-term Launch phase focused on legal separation and financing architecture, a Growth phase centred on scaling midstream processing, and a Maturity phase consolidating competitiveness and embedding hemp within South Africa's broader decarbonisation agenda. The study concludes by recommending that institutional arrangements be simplified, decentralised, and more substantively private sector led to ensure effective implementation.

## Approach and Methodology

---

The framing of the approach and methodology is shaped by the absence of reliable data given decades of prohibition, the nascent status of the hemp industry, and differences in how countries collect and report hemp data. Significant data gaps exist for harmonising cross-border trade, and the

coordination of data collection has not yet been systematised nor integrated into the national system of accounts. This limits the accuracy and comprehensiveness of the evidence-base of the study, and necessitated some creativity around, for example, market sizing and projections.

As such, the study employs a mixed-methods approach, incorporating economic and financial modelling, desktop and literature reviews, semi-structured interviews, and focus group discussions with a broad spectrum of global and local experts. Over the 4-month period, a total of 47 semi-structured interviews and 2 focus groups discussions were conducted with stakeholders representing over 60 countries and different sectors across the value chain.

These methods were applied to an incremental journey that first built evidence (“discovery”) and then used that to inform recommendations (“design”).

The Discovery comprised detailed documentary research to clarify hemp’s definition and support segmentation within the value chain; a comprehensive global and local demand assessment combining qualitative insights from industry experts with quantitative market data; and the identification of priority demand pathways using economic complexity and relatedness tools, triangulated with data from the qualitative research.

Building on this foundation and the identified priority demand pathways, the Design focused on assessing economic feasibility (primary cultivation and primary processing) and outlining the multi-dimensional enablers necessary for hemp industrialisation and competitive scale-up.

## Key findings

---

Findings are structured in 6 chapters. Chapters 1 to 4 - the Discovery Phase of the study - build up the evidence-base; Chapters 5 and 6 hone in on the strategic choices to be made around the regulatory reforms, industrial enablers and institutional models needed for the country to catch up and compete and establish itself as a major driver of the continent’s green industrialisation ambitions.

---

### CHAPTER 1: WHAT IS HEMP?

---

This chapter provides a nuanced, foundational understanding of what hemp is (and is not), including its ancient origins, its journey across civilisations, its uses across industries, and its complex evolution within the South African context. Drawing from established sources, this chapter situates hemp within both historical and modern frameworks, providing a clear picture of a plant whose relevance spans thousands of years and whose potential continues to expand.

Although hemp is botanically the same species as dagga or marijuana, the chapter demonstrates that this similarity has often obscured far more important distinctions related to purpose, plant part, chemical composition, and end use. These distinctions matter, because they determine whether cannabis is treated as an intoxicating substance or as an agricultural and industrial crop. Understanding hemp therefore begins not with novelty, but with clarity.

The chapter establishes that hemp is not a new or experimental crop. It is one of the world’s oldest domesticated plants, with more than 8,000 years of documented use and deep linkages to early industrial development. For much of human history, hemp was a foundational resource, providing

fibre, food, fuel, and materials essential to everyday life and economic activity. Its temporary disappearance from mainstream agriculture in the 20th century reflects regulatory and political choices rather than any decline in utility.

South Africa's own relationship with hemp is longer and more substantial than is often recognised. Formal cultivation and research efforts began in the early 1990s and were supported at the highest political levels, yet commercial development was constrained for decades by regulatory uncertainty and conflation with intoxicating cannabis. This mirrors global trends, where industrial hemp was caught within restrictive drug-control frameworks despite being explicitly excluded from international narcotics conventions.

The chapter also explains why hemp is re-emerging now. Around the world, governments are revisiting historical distinctions between hemp and intoxicating cannabis, driven by sustainability priorities, demand for renewable materials, and the need for more resilient agricultural and industrial systems. These shifts have restored hemp's legitimacy as an agricultural commodity and reopened pathways for its use across manufacturing, construction, food systems, and bio-based industries.

Chapter 1 confirms that hemp is a well-understood plant with deep historical roots, renewed global relevance, and clear alignment with South Africa's contemporary development objectives including diversification, inclusion, and decarbonisation. The chapter establishes a simple but critical point: hemp is a crop that merits serious interest, informed consideration, and deliberate policy attention in the South African context.

---

## **CHAPTER 2: VALUE CHAIN ASSESSMENT**

---

Understanding the hemp sector requires a structured lens through which its diverse uses, regulatory environment, and industrial potential can be viewed. This chapter lays out a segmented, demand-led value chain assessment from upstream seed supply, on-farm cultivation, midstream processing to downstream manufacturing. This work is primarily based on high-level desktop research, however qualitative interview data from engagements with local hemp stakeholders across the different value addition stages has been incorporated to validate the findings per value chain segment.

This allows for a common understanding about how value is created at different stages of the hemp supply chain which lays out the foundation for targeted policy interventions, industrial planning, and commercialisation strategies later discussed in this report.

The chapter begins with a re-orientation of the supply chain, starting first with demand and then "working" backwards to outline requirements for vertical co-ordination from upstream to downstream. The Value-Chain Assessment applies a segmented framework based on the end-uses or applications of hemp - the 5F demand segments - Farming, Foods, Feeds, Fibres, and Fractions. Major demand pathways are identified across these segments, together with drivers, actors, regulatory frameworks, technologies, capabilities, and processes ripe for optimisation.

The Value Chain Assessment finds that hemp offers a viable platform for diversified value addition, capability building, and scalable industrialisation in South Africa. Hemp's diversification opportunities, unique plant attributes, and relevance to South Africa's agricultural and industrial context make it a compelling and strategic investment prospect.

What remains is to prioritise hemp demand pathways and vertically integrated value chain opportunities where South Africa can be competitive - that is, where sustainable market demand exists, productive capabilities are evident, and price competitiveness can be achieved, obviously accounting for a more enabling suite of industrial enablers. This prioritisation will be informed by a comprehensive global demand assessment, local market sizing, and economic complexity analysis to identify frontier products that are both feasible and desirable. This is outlined in the following chapters 3 and 4.

---

## CHAPTER 4: DEMAND ASSESSMENT

---

While Chapter 2 establishes the foundational importance of focusing on demand in developing a competitive hemp industry, Chapter 3 takes a closer look at understanding industrial hemp demand from both global and local perspectives. Given the emerging nature of the sector and limited data availability, this chapter provides a high-level assessment designed to capture key demand trends and insights, to prioritise and focus efforts, feeding directly into Chapter 4, where demand pathway prioritisation are explored, and Chapter 6 where the regulatory reforms and policy enablers required to realize latent hemp demand are outlined.

The Demand Assessment - informed both by extensive desktop research and subject matter expert interviews - is presented through two complementary lenses: an outside-in view that examines global demand trends, and an inside-out perspective focusing on South Africa's domestic market. The first section provides a high-level global demand assessment, highlighting key drivers, emerging industrial pathways, and regulatory factors - both challenges and enablers - that influence market dynamics. This section also considers how new entrants like South Africa can strategically position themselves to capture growth opportunities in the expanding hemp sector.

The second section turns inward, offering a quantitative and qualitative evaluation of current and projected domestic demand for hemp products in South Africa. Given the nascent stage of the local industry and regulatory constraints on cultivation, this assessment faces significant data limitations. South Africa's industrial classification systems and international trade statistics do not yet fully capture hemp-related economic activity, making precise measurement difficult. To address these gaps, the analysis is supplemented with insights from stakeholder consultations, providing a nuanced understanding of market potential and realistic opportunities.

The outside-in view finds that global hemp demand is surging, driven by sustainability goals, decarbonisation efforts, enabling regulations, and innovations across diverse markets. Rather than being perceived as a latecomer, South Africa is seen as a new entrant with unique advantages to provide reliable, standards-aligned supply, leverage strong industrial capabilities, and benefit from counter-seasonal production. This positions it well in this emerging sector.

A clear regulatory framework has enabled growth in other hemp markets, where hemp's flowering parts are regulated separately from fibre and grain. This has removed barriers and built investor confidence. Key here has been government commitment and certainty which has reduced risks linked to regulatory ambiguity. Equally important has been ensuring farmers benefit economically, which is key to sustaining growth.

Beyond regulation, clear government signals are critical. Investors seek consistent, visible, and sustained commitment through strategic communication, timely policies, financing tools, and

stakeholder collaboration. Without such signals, momentum stalls. Governments that back commitments with pilot projects, funding, streamlined licensing, and public-private partnerships have built trust and fostered innovation across the hemp value-chain.

Locally, South Africa's market shows promise, especially in fibre substitutes and manufacturing sectors like textiles, construction materials, foods, and bio-composites. This is confirmed by local stakeholders. These demand pathways could stimulate rural economies but face (supply and demand-side) barriers including regulatory uncertainty and limited processing infrastructure. Without clear legal frameworks, producers struggle with licensing, compliance, and market access, while limited processing capacity - specifically for fibre - restricts transforming raw materials into viable products, stifling demand and discouraging cultivation.

Given severe data limitations, a conservative local market sizing exercise estimated hemp demand in South Africa at R7.3 billion in 2024 (compared to +R200 billion globally, growing at +17% CAGR). Despite restrictive assumptions, results suggest market potential could grow to R17.7 billion by 2030 and R40.4 billion by 2040 with growing production capabilities, cost efficiencies, new technologies, and decarbonisation demands. Food and beverage, retail pharmaceuticals, and textiles represent the largest market opportunities, with chemical products also showing growth potential.

South Africa's favourable climate, industrial base, and continental leadership offer strong foundations. Diverse agro-ecological zones suit various hemp varieties, and existing manufacturing can adapt to hemp inputs to address decarbonisation objectives. Large-scale commercial readiness is evolving, but realising potential requires sustained government backing, demonstration projects, and a long-term commitment to build a mature, globally competitive industry over the course of the next decade and beyond.

---

## **CHAPTER 4: PRIORITY DEMAND PATHWAYS FOR SOUTH AFRICA**

---

Chapters 1 through 3 establish a foundational evidence base regarding what hemp is, how its value chain works, and the quantum and shape of demand. Among the key takeaways from these is that the hemp sector presents a large, complex, and highly diversified character, offering multiple opportunities for stimulating investment and market activity. From a strategic standpoint, it is neither feasible nor desirable to pursue every opportunity that emerges, not least for countries such as South Africa with constrained state capabilities. As such, some level of prioritization becomes imperative, and there are, of course, many ways to do this, depending on the context. In the absence of a guiding National Policy or Strategy for hemp in South Africa and limited general primary evidence base, a multi-layered and multi-disciplinary approach to prioritisation has been applied. This Chapter provides some view on "where to focus", offering a methodical process for selecting priority demand pathways that form the subject of focused industrial policy interventions in Chapter 6.

Focus is placed on competitiveness and diversification as driving metrics. Both a quantitative lens, based on Economic Complexity Analysis and the Frontier Product Approach, and a qualitative lens, drawing from the value chain and demand assessment, are synthesised to ensure a holistic view of all demand pathways.

Opportunities are ranked and prioritised based on size and growth, attractiveness, and feasibility across different tiered “horizons” before making final recommendations on demand pathways that inform the policy enablers and recommendations.

The Chapter is structured into two primary sections. The first applies a frontier-products approach and economic-complexity analysis to identify high-potential hemp products and map them to demand pathways across the “5 F’s” (Fibres, Fractions, Food, Feed, Fuel). The second section applies a mixed-methods prioritisation process, combining quantitative and qualitative metrics to identify Tier 1, Tier 2 and Tier 3 industrial pathways suitable for catalytic investment and state support.

Across all analytical lenses, a consistent Tier 1 group emerges, comprising general textiles, personal care, pulp and paper, food and beverages, and building and construction. Although these pathways draw on different parts of the hemp plant, they share common attributes, including strong and growing demand, proven or readily adaptable technologies, and realistic prospects for localisation. Together, they represent the most compelling opportunities for early-stage industrialisation within the South African context.

The chapter further highlights the importance of an integrated approach to hemp development. The complementarities between grain-based and fibre-based pathways, as well as between food, materials, and industrial applications, indicate that multiple demand pathways can be developed concurrently where shared infrastructure, processing capabilities, and supply systems exist. This underscores the need for coordinated system-level interventions rather than fragmented, product-specific initiatives.

At the same time, the analysis confirms that prioritisation is not static. As domestic capabilities deepen, regulatory clarity improves, and market dynamics evolve, pathways currently positioned in the second or third tier may advance, while others may require renewed support to maintain momentum. The prioritisation framework should therefore be understood not as a fixed endpoint, but as a strategic, evidence-based tool to guide sequencing, investment decisions, and policy focus over time.

The prioritisation exercise demonstrates that South Africa’s hemp sector contains a diverse mix of opportunity pathways that differ markedly in market size, feasibility, and readiness. By combining quantitative indices, qualitative assessment metrics, and a synthesised analytical lens, the chapter establishes a coherent hierarchy of opportunities that recognises both immediate prospects and longer-term potential. While hemp presents a wide array of possible applications, only a subset exhibits the combined characteristics required to support near-term industrial development, including sufficient market depth, technical readiness, scalability, regulatory feasibility, and alignment with existing economic capabilities.

Overall, the findings of this chapter provide a clear and grounded basis for strategic decision making. By concentrating on pathways where South Africa can realistically build competitive advantage in the near to medium term, the country is well positioned to translate hemp’s multipath potential into targeted industrial development, broader participation, and durable economic value.

---

## **CHAPTER 5: EXPLORING THE ECONOMIC VIABILITY OF HEMP IN SOUTH AFRICA**

---

The prioritisation exercise in Chapter 4 identified six Tier 1 Demand Pathway priorities. Of these, two (Food and Beverages and Personal Care) require input feedstock primarily from hemp

grain-derived oils, and four (General Textiles, Clothing Textiles, Pulp and Paper, and Building and Construction) from either bast or hurd/shiv derived hemp straw, retted or un-retted.

As discussed in Chapter 2, growing different plant parts also entails different assumptions, requirements, and costs, each of which impacts its cultivation's viability. That is, the economic viability varies depending on what it is grown for. This chapter applies unit economic analysis to establish the degree to which the primary cultivation and primary processing (of hemp straw) is viable in a South African context. In so doing, the chapter also identifies and, to the extent possible, quantifies the gaps, challenges, or opportunities that may be addressed by deploying sets of industrial policy tools, instruments, and other enablers to enhance and materialise the South African hemp business case.

The chapter comprises two main sections. The first section of this chapter applies unit economic analysis to assess the viability and security of a supply of raw hemp to downstream manufacturers in terms of volume, quality, and price. A detailed bottom-up cost-stack of cultivation for different purposes (e.g., fibre or grain) and under different production models (e.g., labour-intensive vs. mechanised) is presented to understand their drivers, the returns they yield, and opportunities to optimise these.

The assessment demonstrates that hemp cultivation in South Africa is economically viable. Commercial viability, however, depends heavily on both the purpose of the crop - whether for fibre, grain, or dual-purpose - and the production model used, including labour-intensive, mechanised rental, or mechanised ownership systems.

Labour-intensive models tend to have higher costs and lower returns, while mechanised models, especially those with owned equipment, show greater profitability. However, access to mechanisation remains a barrier for many farmers, particularly smaller-scale or new entrants. There is considerable opportunity for innovation and adaptation in mechanisation technologies and business models, such as equipment rental schemes, to broaden access and scalability.

The second section of this chapter focuses on Processing Unit Economic Analysis, presenting high-level returns analysis of a theoretical hemp straw primary processing plant in South Africa, to understand the potential returns, the sensitivities to various inputs, and the opportunities for optimisation.

Processing - or the mid-stream - hemp is a critical activity to convert farm-gate products into usable raw materials for downstream manufacturing. While South Africa possesses capabilities in grain processing, there are glaring gaps for hemp straw processing. This is an important unlock given hemp straw's multitudinous uses downstream, but also for unlocking the upstream potential for cultivation of both straw and grain. As noted in Chapter 3, while local downstream demand could theoretically be solved for via imports, operators note challenges in reliable supply and price, and many noted a preference to source locally.

Importantly, the study found that processing straw in South Africa appears to be a viable proposition, but only if operators can secure markets and supply can be scaled relatively quickly.

This is an important finding as it confirms, notwithstanding the assessment's limitations, that the twin opportunities of cultivation and processing present prospects for greater investment and allow for higher value capture locally.

However, the costs of mechanical straw processing are not insignificant, whether for an individual business (estimated at R150 million) or for the sector more broadly given the multiple processing facilities required in different geographies. Without tailored instruments and/or other incentives processing startup costs are prohibitive, even though the proposition is still viable.

Scale and throughput are important considerations given their impact on returns and ultimately viability. Important considerations must be made on how to accommodate resolving the chicken and egg problem - where farmers won't grow without market, and processors won't invest without guaranteed supply - while generally how to develop and enhance the supply chain in ways that allow sustainable access to markets.

The chapter makes several recommendations to build the supply chain through enhancing the viability of cultivation and processing.

Among others, these include:

- Support for validation trials to assess the relative performance of various hemp cultivars under different production methods and parameters. This data is critical for securing offtake as processors typically select or specify genetics based on yields and quality of processed parts, as well as accessing finance and securing investment particularly for mid-stream since financiers often require both guarantees of demand *and* supply.
- A focus on yield improvement is essential for making hemp cultivation more attractive and competitive, particularly in grain production where yields and quality remain comparatively low.
- Establishing robust seed multiplication and distribution networks to reduce cultivation costs and dependency on imports, shorten supply chains, and increase availability for farmers at different scales.
- Support for mechanisation including interventions that support farmer aggregation to facilitate machinery sharing across many farmers who would on their own be sub-scale, rebates for imported machinery, and asset-assist type interventions that provide highly concessionary financing for targeted populations such as women or youth. This is critical for realising inclusion outcomes in the hemp supply chain.
- Suites of instruments that incentivise investment in mid-stream processing technology, (e.g., preparing investible business plans, reducing amortisation burdens, concessionary debt financing, development finance grants etc.), tailored to the needs of processors. This is critical given the requirement for multiple decorticators across the country due to high hemp straw transportation costs.

---

## CHAPTER 6: POLICY ENABLERS

---

The first five chapters of this study focus on establishing a core evidence base with which to assess the extent of hemp's business case in the South African economy. The key finding from this exercise suggests that there is both a business and developmental case, however given that hemp is a nascent industry there is a need for critical industrial enablers to fully unlock the opportunities identified.

Chapter 6 focuses on leveraging the evidence base established to recommend a suite of industrial policy tools, levers, and instruments - what is collectively call “industrial enablers”- that may be sequentially deployed in support of the hemp sub-sector.

The chapter draws from the evidence of countries which have built up competitive hemp value chains. Regulatory reforms, especially the clear separation of industrial hemp from intoxicating cannabis, is the foundational enabler. There are other critical enablers including support for farmers - “the farmer must always win”; a clear strategy to sequentially build productive capabilities across the value chain; centrally coordinated regulation with a light touch; shared risk-instruments that leverage private sector investment; investment in innovation and support for pilot projects and commercialisation; spatial clustering; effective and efficient institutional mechanisms for the private sector to continually interface with government.

International experience also shows that hemp competitiveness requires value chain co-ordination and integration which is built over many decades. In the absence of a hemp industrial strategy, and in recognition of South Africa’s poor track record in infant industry support and limits of the current Cannabis Masterplan, the study calls for realistic expectations.

The chapter makes the case that prioritisation and sequencing are critical. Critical short-term outcomes -what could be called a “minimum programme of action”- to be realised over the next 3 years includes:

First, formally separate hemp from intoxicating cannabis and establish a clear industrial strategy: Hemp must be unequivocally differentiated in law, policy, and administration and treated as an agricultural and industrial commodity. This separation should be accompanied by a clear industrial strategy for hemp, potentially supported by dedicated legislation or a formal policy framework, to remove regulatory ambiguity and provide a stable foundation for investment and coordination. Focus on building and validating data and evidence, with a bias for action.

Second, aggressively stimulate/develop markets to enable vertical coordination and capability formation in the supply chain: Early industrialisation must be driven by demand. This requires active market stimulation focused on vertical coordination between farmers, processors, and manufacturers, while deliberately building missing capabilities, particularly in mid-stream processing. Time-bound incentives, procurement levers, and support for downstream pilots are critical to create reliable demand signals that pull the value chain. In the first instance, focus on structured engagements with output markets and buyers across identified priority demand pathways. And simultaneously explore short-term measures for enabling access to imported goods (seeds, agri-machinery, processing and manufacturing equipment).

Third, develop a coherent financing plan for the sector: A dedicated hemp financing architecture is required, anchored in a sector-focused fund and complemented by a suite of blended finance instruments aligned to business maturity, venture stage, and end-use markets. This must include structured de-risking mechanisms such as project preparation, deal origination, and pre- and post-investment technical support to crowd in private and institutional capital, especially for “missing middle”, mid-stream processing.

Fourth, enable competitive farmer development aligned to market requirements: Farmer support must shift from permitting-led participation to competitiveness-led inclusion. Priority should be given to three pillars: secure market access through aggregation and offtake arrangements; access to

appropriate finance, including working capital and equipment; and targeted skills development aligned to specific demand pathways and quality requirements.

Fifth, support emerging industrial champions and clustering initiatives: Targeted support should be provided to existing and emerging industrial champions with demonstrated capabilities, particularly those operating through clustering and aggregation models. These actors play a critical role in anchoring demand, coordinating supply, and accelerating learning-by-doing in a nascent sector.

By the end of this 3 year- phase, South Africa is expected to have regulatory clarity, a refined strategic framework, early mover projects, and foundational partnerships in place, creating the conditions for replication and scale.

The study finds that institutionally, the current configuration of the Cannabis and Hemp Masterplan presents both opportunities and limitations. While it provides a platform for coordination, its methodology and structures are not well suited to the distinct requirements of a nascent industrial hemp sector. The lack of differentiation between hemp and intoxicating cannabis, the absence of a strong evidence base, and the highly centralised, process-heavy governance arrangements have constrained progress to date.

It is important to not only rely on government to lead industrialisation - private sector actors and investors need to be included to share the risk, activate demand, and build capacity. Addressing these shortcomings will require re-imagining how hemp is positioned within existing industrial policy frameworks, simplifying oversight arrangements, and empowering regional and sector-specific implementation mechanisms.

# Introduction

---

## Context and Background

At the dawn of South Africa's democracy in the late 1990s, the country embarked on a 30-year long journey towards hemp liberalisation and commercialisation, recognising then as it does now, the potential for the sector to contribute to innovation and skills development, livelihood and job creation, and ultimately prosperous industrial development. For over two decades, significant research and development was undertaken, and investment made, across multiple areas of the value chain from breeding to product valorisation, driven by the national department of Agriculture alongside the Eastern Cape province, other research institutions (notably the Agriculture Research Council (ARC) and the Centre for Scientific and Industrial Research (CSIR) and other private sector companies (House of Hemp). In spite of these, a regulatory framework that made no distinction between "dagga" - intoxicating varieties of cannabis, which endow South Africa with its cannabis provenance and a unique heritage, but which remains a controlled substance under local Drugs and Medicines Acts - and "hemp" meant that the prospects of the latter were intrinsically tied to the former. Indeed while the commercial production of hemp remained illegal (although processed hemp parts were not), the South African national department of Health issued R&D licenses for research purposes until the early 2020s. Notable events in 2017 (South African Constitutional Court Ruling in September 2017 declaring the prohibition of private-use cannabis unlawful) and 2018 (the United State of America's "Farm Bill") caught South Africa in their wave, leading to seminal changes locally. In 2018, South Africa announced a Medical Cannabis programme with commercial licences issued by the South African Health Products Regulatory Authority to operators. The following year, in 2019, the President of the Republic declared during a State of the Nation Address that Cannabis/Hemp was among 14 priority sectors selected to drive the country's Reimagined Industrial Strategy. This moment was significant in two ways, (i) it shifted the paradigm in terms of general public's imagination of dagga as an industrial product, and (ii) stimulated new thinking among policy makers about efforts to leverage the state's industrial policy towards its enablement.

From 2019, government began a "Master-planning" process for what was termed the "Cannabis and Hemp" sector. This Masterplan methodology, also employed by other priority sectors such as Automotives or Clothing and Textiles, has been the dominant industrial policy planning tool in South Africa and it is principally based on facilitating reciprocal commitments among social partners (government, business, labour, and community) to meet a set of common goals and objectives (e.g., production outputs, local content %, global market share etc.). In 2019, the Department of Health announced changes to schedules of the Medicines Act (previously Drugs Control Act) 101 of 1965, which had previously criminalised whole-plant cannabis for any and all uses. This, for the first time in the nation's history, separated cannabis by its end use and based on its intoxicating cannabinoid content and thereby created a pathway towards the full liberalisation of hemp. Then in 2021, the (then-lead) department of Agriculture published a National Cannabis Masterplan document that was meant to establish guidelines for sectoral development. The document, which has since, according to the author's knowledge, not been updated suffers from several challenges that inhibit a clear

pathway to industrialisation: unclear regulatory framework, no distinction between dagga and hemp, a predominantly supply-focused approach lacking linkages markets, limited consideration about investment, trade and finance stimulation, and no clear programme of assigned actions across stakeholders. Critically, it lacks a clear strategic imperative given that, unlike other Masterplans in more developed sectors, it was not informed by a clear evidence base that demonstrates the national “business case” for the sector.

Recognising these limitations, the PMO at the office of the Presidency, working together with the DTIC, commissioned research work in 2023 to understand both the “as-is” status of the sector as well as financing requirements and appropriate instruments for catalysing investment. While these contribute meaningfully to building a business case for the sector, given the breadth of their scope they provide a necessary albeit insufficient evidence base to allow policy makers (who are often also investors) to make informed strategic choices about what to focus on, where, how, for how much, and with what industrial enablers. This is also particularly important given current constraints on the national fiscus so that valuable limited resources can be deployed to interventions or sectors that offer the most compelling potential impact, however defined. Today, through the passing of the Cannabis for Private Purposes Act (CfPPA) in May 2024, hemp is finally and fully liberalised in South Africa. However, there is yet a clear plan on how to translate decriminalisation and liberalisation into industrialisation and commercialisation. That is, South Africa lacks a clear business case for industrial hemp.

## The Scope of the Study

---

To address this gap, the Localisation Support Fund, in collaboration with the Project Management Office in the Office of the President of the Republic of South Africa, the Industrial Development Corporation and the Department of Trade, Industry, Development and Competition, have commissioned this “Hemp Industrialisation Study” to explore the extent to which there is a business case for investment in the sector. This study aims to understand the requirements for stimulating competitive, localised downstream manufacturing of hemp anchored on 5 “Priority Demand Pathways”, and the extent to which a positive business case exists for these. Principally, the study is guided by the following **primary and derivative questions**:

- 1) **Is there a market (or addressable market) for South African hemp local and globally?** What is the shape and size of the market, how is it growing, what’s driving it, how competitive is it, which segments or Demand Pathways are most attractive, what are market perceptions, etc.?
- 2) **Is there a net positive tangible return to be made from hemp?** Understood in both financial and non-financial returns and could include ROE, IRR or Social ROI (jobs, diversification, inclusion, decarbonisation etc.), what is the impact of any investment made?
- 3) **Is it feasible to execute?** Understood as the requisite enablers/capabilities (e.g., skills, capacity, technology etc. across value chain activities) and operating environment (e.g. hard and soft infrastructure, finance and investment, logistics, regulations and standards etc.) at the sectoral (and adjacent) level, are these in place to ensure and sustain competitiveness?
- 4) **If so, then how?** Is broad suite of industrial policy tools and instruments with supporting institutional arrangements to facilitate, catalyse, enhance, support, or enable the opportunities identified?

Notably, it is hoped that while such a study contributes to informing direction towards strategic choice and planning, this Study is not a bankability assessment for investment opportunities, and readers are urged to take cognisance of this. Instead, it seeks to consolidate a foundational evidence base - building on the efforts of others - that bridges the knowledge asymmetry between policy makers, emerging industry participants - including early-stage startups and small-scale cultivators - ultimately provides an approach for how to answer these key questions.

## Objectives

---

To that end, the Study is framed around **7 key objectives**:

1. To establish a common base on what hemp is and is not;
2. To undertake detailed, segmented, and demand-led value chain assessment to understand the machinations of the hemp supply chain and the requirements for meeting downstream requirements;
3. To conduct a demand or market assessment to understand its quantum, shape, requirements, growth, drivers etc. both globally and locally;
4. To assess capabilities and readiness for hemp industrialisation within the local ecosystem;
5. To identify and prioritise demand pathways and opportunity sets in the hemp value chain with optimal prospects for achieving national goals (e.g. growth and green industrialisation);
6. Evaluate cost competitiveness and viability of activities in the value chain that feed that are critical for localised downstream manufacturing, and finally;
7. Develop recommendations how these prioritised demand pathways can be supported through industrial policy actions.

## Approach and Methodology

---

It is important to preface a discussion of the methodology by a brief discussion on data availability. Hemp is an old commodity finding new global resurgence, but given decades of prohibition the availability of localised data is, at best, sparse. Indeed, a 2022 hemp commodity report published by the United Nations Conference on Trade and Development (UNCTAD), also highlighted significant data gaps, particularly for harmonising cross-border trade, and differences in how nations collected and reported that data. In South Africa, data on hemp is highly disaggregated (where it does exist) and the coordination of data collection has not yet been systematised nor integrated into the national system of accounts. Furthermore, where data exists, it is often publicly inaccessible to researchers and operators and in many cases outdated or unreliable. The Study therefore relies on some creativity to ensure both data quality and reliability and as holistic a view as possible. It makes no claims to being comprehensively exhaustive and indeed identifies several areas that would benefit from more detailed or focused study or where data is particularly limited.

As such, this Study employs a mixed-methods approach, incorporating economic and financial modelling, desktop and literature reviews, semi-structured interviews, and focus group discussions with a broad spectrum of global and local experts. Over the 4-month period, a total of 47 semi-structured interviews and 2 focus groups discussions were conducted with stakeholders from over 60 countries representing different sectors across the value chain and 5F Framework. Throughout,

strict adherence to ethical standards and compliance with South Africa's POPIA legislation ensured the responsible handling of personal data. These methods were applied to an incremental journey that first builds evidence ("Discovery") and then uses that to inform recommendations ("Design").

- The Discovery comprised detailed documentary research to clarify hemp's definition and support segmentation within the value chain; a comprehensive global and local demand assessment combining qualitative insights from industry experts with quantitative market data; and the identification of priority demand pathways using
- economic complexity and relatedness tools, triangulated with data from the qualitative research.
- Building on this foundation, as well as the priority demand pathways, the Design focused on assessing economic feasibility (primary cultivation and primary processing) and outlining the multi-dimensional enablers necessary for hemp industrialisation and competitive scale-up.

This journey frames the synthesis of findings, insights, and recommendations of that research into the chapters of this report:

- **Executive Summary** provides a succinct overview of the Study with a focus on key findings and results, as well as recommendations.
- **Chapter 1** introduces the hemp crop, broken down into its component parts, and positions its place in South Africa's past and future. It also establishes the study's conceptual base, a demand-oriented and segmented view of hemp the plant and sector.
- **Chapter 2** builds on this conceptual groundwork by mapping out the end-to-end hemp value chain in South Africa, assessing not only key activities and players but also critical capabilities, gaps, opportunities and requirements for downstream demand. A foundational chapter, it frames and introduces themes that are explored in detail in subsequent chapters.
- **Chapter 3** provides both a qualitative and quantitative assessment of the outside-in viewpoint of global demand and the inside-out viewpoint of local demand and market dynamics. It aims to not only size demand and understand its characteristics but also provides perspectives on how South Africa may be able to capture greater share of it.
- **Chapter 4** utilises complexity and relatedness analysis, supported by qualitative validations from stakeholder engagements, to identify the 5 priority hemp "demand pathways" that can anchor the South African hemp business case and may be considered for targeted industrial policy support. This chapter draws on Chapters 1 to 3 to inform outputs for subsequent chapters.
- **Chapter 5** assesses the extent to which key value-chain activities feeding into these demand pathways - that is, primary cultivation and processing - are economically viable in South Africa and potentially globally competitive. It also identifies gaps, challenges and opportunity "white space" areas in which industrial policy may be leveraged to enhance or enable the business case.
- **Chapter 6** leverages the evidence base and findings to recommend targeted sets of industrial policy instruments, tools, and accompanying institutional arrangements instruments critical for enabling sector development more generally, and the South Africa hemp business case, specifically. In addition to supply and demand-side interventions, it also provides a way forward on how to translate this research into a sequenced, resourced, time-bound, and outcomes-oriented sets of actions.

- **Finally**, the Study concludes with a summary of the findings, key takeaways, recommendations, and areas for potential future exploration and investigation.

This Study reflects both the ambitions of its commissioners and the efforts of its authors to provide a common evidence base for the South African hemp sector as well as a strategic direction and guide for policy makers tasked with relevant responsibilities for its investment and development. Of course, this Study naturally suffers from several limitations, which will no doubt be resolved by other researchers in future. Nevertheless, it is hoped that its outputs, however small, may be catalytic in reawakening and accelerating opportunities - many lying dormant for years - that today find (new) expression in South Africa's industrial future.

# Ch 1: What is Hemp

---

Hemp is re-emerging globally as one of the most significant industrial crops of the 21st century, yet few understand the depth of its history, the breadth of its applications, or the scientific and legal distinctions that define it. This chapter aims to provide a nuanced, foundational understanding of what hemp is (and is not), including its ancient origins, its journey across civilisations, its uses across industries, and its complex evolution within the South African context. Drawing from established sources, this chapter situates hemp within both historical and modern frameworks, providing a clear picture of a plant whose relevance spans thousands of years and whose potential continues to expand.

## 1.1 Segmentation

---

Scientifically, there is no difference between “hemp” and “dagga” or “marijuana.” Cannabis is a diverse plant, and the terms that distinguish its varieties have developed to reflect different purposes or end-use, that is, different demand pathways. Although a botanical taxonomy study conducted by Professor Ernest Small in the 1970s has often been cited by legislators, his work has been repeatedly and publicly clarified by the author himself as having been scientifically misinterpreted over the years<sup>1</sup>.

“Hemp” is therefore a statutory definition, used at the discretion of each jurisdiction to distinguish cannabis bred for what is widely, though incorrectly, referred to as “industrial purposes,” from cannabis termed “marijuana” or “dagga.” These purposes diverge significantly: hemp production is oriented toward stalk and grain, whereas dagga production is oriented toward flowers (inflorescence). Demand for marijuana and dagga is driven primarily by intoxicating cannabinoids, chiefly “delta-9 THC” and its isomers, which are almost exclusively concentrated in the flowering tops of the plant.

This functional distinction is mirrored in international drug control law. The United Nations’ three Narcotics Conventions, the 1961 Single Convention as amended in 1972, the 1971 Psychotropics Convention, and the 1988 Illicit Trafficking Convention - define cannabis for control purposes as the “fruiting and flowering tops” of the plant, together with psychotropic THC. Notably, the conventions do not regulate the cannabis plant as a whole, nor do they impose THC thresholds. Instead, individual jurisdictions set their own limits, which range widely, from 0.2 per cent in France to as high as 2 per cent in South Africa, often referencing Dr Small’s work despite its acknowledged misapplication.

---

<sup>1</sup> <https://nationalhempassociation.org/originator-of-the-0-3-thc-definition-of-hemp-advocates-for-1/>

The practical implications of this segmented regulatory reality, across international conventions and South African law, are summarised in Table 1 below, which contrasts the treatment of hemp and dagga across key legal and policy dimensions.

**Table 1: Regulatory Distinctions**

| International Framework   | South African Context   |
|---|---|
| <ul style="list-style-type: none"> <li>• UN narcotics conventions govern intoxicating cannabis (flowering tops and psychotropic THC).</li> <li>• These conventions <b>do not</b> regulate hemp: cannabis for industrial purposes has never been scheduled.</li> <li>• THC thresholds are set by individual jurisdictions and vary widely (0.2% in France; 2% in South Africa).</li> </ul> | <ul style="list-style-type: none"> <li>• The Cannabis for Private Purposes Act mirrors UN definitions by focusing on flowering tops.</li> <li>• Hemp is treated as an agricultural commodity and is being progressively liberalised.</li> <li>• Commercialisation of intoxicating cannabis remains criminalised.</li> <li>• All enabling regulations for food, clothing, chemicals, feed, cosmetics, or pharmaceuticals are themselves <b>segmented</b>, highlighting the need for a formalised industrial separation.</li> </ul> |

Crucially, cannabis cultivated for industrial purposes, now commonly referred to as hemp, has never been included in any schedule of the UN Narcotics Conventions, explicitly and from their inception, including during the Opium Conferences that preceded the 1961 Single Convention. This long-standing exclusion provides the legal basis for treating hemp as an agricultural and industrial commodity rather than a narcotic substance.

In South Africa, these international principles are reflected in domestic law. The Cannabis for Private Purposes Act (CfPPA) mirrors the UN definition of dagga by focusing regulatory control on the flowering tops of the plant and, similarly, does not introduce a THC threshold. With the removal of cannabis from the Drugs and Drug Trafficking Act, hemp is, in principle, fully liberalised. However, all secondary regulations that give effect to this liberalisation, whether governing food, clothing, chemicals, feed, cosmetics, pharmaceuticals, or other sectors, are themselves segmented. At the same time, the commercialisation of dagga remains criminalised under the CfPPA, the amended Drugs Act, and South Africa’s international treaty obligations. Hemp therefore requires distinct and targeted treatment as an agricultural commodity, separate from intoxicating cannabis.

## 1.2. Understanding Hemp

Hemp refers to *Cannabis sativa* L., a species within the Cannabaceae family. Although botanically identical to “marijuana” or “dagga”, hemp is differentiated by purpose or end-use, plant part, and regulatory classification. Its defining legal characteristic is its low tetrahydrocannabinol (THC) content, which is established by each jurisdiction and ranges from 0.2%<sup>2</sup> to 2%<sup>3</sup> on a dry-weight

<sup>2</sup> Small, E. (1979). *The Species Problem in Cannabis: Science & Semantics*. Ottawa: Agriculture Canada.

<sup>3</sup> <https://www.medigrow.co.za/news/thc-limits-to-increase-tenfold-to-2-under-dtcs-new-hemp-plan/>

basis. Across these regulatory settings, the underlying principle remains consistent: hemp contains insufficient THC to produce **intoxicating** effects; hence it is treated as an agricultural commodity rather than a narcotic product.<sup>4</sup>

As a sustainable and highly adaptable crop, hemp thrives across diverse climates, grows rapidly, and requires minimal water and pesticides. Its environmental benefits are notable: it improves soil structure, suppresses weeds naturally, and sequesters significant amounts of carbon dioxide.

Because the entire plant is usable (i.e., all its constituent physical plant parts are marketable), hemp has historically served as a highly versatile resource. Its applications range from paper, rope, and textiles to oils, bioplastics, construction materials such as hempcrete, nutritional products, and cosmetics.

The modern global resurgence of hemp is closely tied to regulatory reforms-including the European Union's low-THC hemp catalogue and the United States' 2018 Farm Bill - which reintroduced hemp as a strategic crop with relevance across industrial, environmental, and economic sectors.

## 1.3 Hemp in the World: "Outside-In"

---

Industrial hemp (*Cannabis sativa* L.) is one of the world's oldest domesticated crops, with cultivation records tracing back over 8,000 years to East Asia - particularly China.<sup>5</sup> Historically, hemp was among the most widely grown and traded crops globally, spreading across nearly every region due to its exceptional resilience, versatility, and adaptability. Civilisations adopted the crop not only because of its durability and fibre strength, but because it provided reliable, renewable raw material for textiles, paper, sailcloth, food, and oil - functions that made it central to early economic systems, particularly in maritime contexts, where hemp's durability and strength were indispensable.

Despite its historic importance, hemp's industrial role diminished sharply in the 20th century not as a result of diminished utility but rather of regulatory and political shifts (including, based on stakeholder insights, lobbying efforts among competing industries), not least given its associations with intoxicating varieties of intoxicating *Cannabis sativa* L plant. The initial changes began with the Opium Conferences of the early 20<sup>th</sup> century, where nations, including the newly formed Union of South Africa particularly under the Jan Smuts administration, motivated for the inclusion of the *Cannabis sativa* L plant among the list of narcotics that the global community was making efforts to jointly or commonly regulate. While some countries, notably India and Netherlands, rejected such inclusion, these initial changes laid the foundations for later distinctions between *Cannabis* for different end-uses, and, by association, its plant parts.

Formal global prohibition of *Cannabis* began in 1961 under the United Nations Single Convention on Narcotic Drugs<sup>6</sup>. This first of later three conventions (jointly and commonly referred to as the UN's Conventions on Drugs and Narcotics) applied the first critical segmentation. First, it applied a distinction between "hemp" and "marijuana" based on end-use, explicitly and at inception excluding

---

<sup>4</sup> UN Single Convention on Narcotic Drugs. (1961). United Nations.

<sup>5</sup> Xiaozhai, L., Clarke, R. C. (2012): The cultivation and use of hemp (*Cannabis sativa* L.) in ancient China.

<sup>6</sup> United Nations. (1961). Single Convention on Narcotic Drugs, 1961. United Nations Treaty Series, vol. 520, p. 151.

Cannabis used for “industrial” purposes. Second, it then also applied a nuanced view of the Cannabis plant, focusing scheduling and prohibitive regulations only on the “fruiting and flowering tops” since it was already understood then that this is where the intoxicating substances (“cannabinoids”) were largely concentrated. Based on these distinctions and within the established guidelines (understood as “minimum requirements”), signatory members to the treaties and conventions were then allowed to exercise sovereign jurisdiction with regards to how they defined and regulated the Cannabis sativa L Plant. Notably, this included the maximum thresholds of cannabinoids in plants to inform statutory distinctions between what a jurisdiction terms “hemp” vs. “dagga”.<sup>7</sup>

Consequently, countries globally took vastly different trajectories for much of the rest of the 20<sup>th</sup> century. For example, hemp prohibition in the United States began in the 1930s (though with a small resurgence during World War II) and then later conflated with “marijuana” to ensure wholesale prohibition. By comparison, China (and to an extent France) maintained these distinctions and continued investment in their industries during the same time. Overall, the conflation dominated global markets especially catalysed by the 1970s “Global War on Drugs” and subsequent restrictive drug-control regimes led to sharp reductions in cultivation, manufacturing, and research. This period of global suppression halted centuries of innovation and disrupted what had been a foundational agricultural commodity.

A number of reforms, beginning in the late 20<sup>th</sup> century and accelerating in the early years of the new millennium - including the European Union’s low-THC catalogue and the United States’ 2018 Farm Bill - have re-established hemp as a legal crop in many jurisdictions. These shifts have restored industrial legitimacy to hemp, allowing governments and markets to re-engage with its potential as a sustainable input into paper, textiles, construction materials, bioplastics, and nutritional products. Today, hemp is once again positioned as a strategic agricultural and industrial resource, aligned with global priorities such as decarbonisation, circular bio-based industries, rural development, and green manufacturing.

## 1.4. Hemp in South Africa: "Inside-Out"

Hemp’s development in South Africa has followed a prolonged and uneven regulatory trajectory, marked by early scientific engagement, extended periods of restriction, and only recent statutory liberalisation -closely reflecting broader global patterns in cannabis control and reform. The crop was first cultivated locally in 1994, with formal trials commencing in 1997. During the early 2000s, both public and private institutions invested in continued research, including the breeding of locally adapted varieties. These activities were conducted under tightly controlled research permits issued by the Medicines Control Council (now SAHPRA), which allowed experimentation but prohibited any form of commercial trade. The result was a period commonly referred to as South Africa’s “Missing

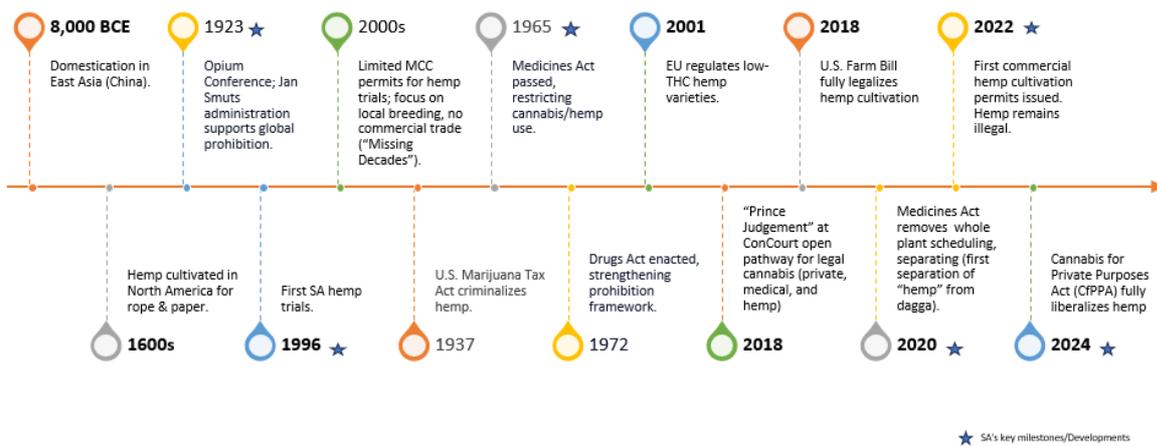
---

<sup>7</sup> Mills JH. The IHO as Actor: The case of cannabis and the Single Convention on Narcotic Drugs 1961. *Hygiea Int.* 2016 Dec 7;13(1):95-115. doi: 10.3384/hygiea.1403-8668.1613195. PMID: 30930679; PMCID: PMC6440645.

Decades,” during which technical knowledge accumulated but industrial development remained effectively frozen.<sup>8</sup>

A significant regulatory shift occurred in 2020, when amendments to the Medicines Act removed the “whole-plant” scheduling of cannabis, formally separating hemp from dagga for the first time. This marked a critical departure from prior regulatory treatment and enabled the establishment of South Africa’s first commercial hemp permitting scheme in 2021. Further legislative progress followed with the enactment of the Cannabis for Private Purposes Act (CfPPA) in 2024, which liberalised hemp at a statutory level. However, a fundamental paradox persists despite this legislative reform, the production of hemp remains unlawful. This unresolved contradiction highlights the continuing gap between policy intent, regulatory implementation, and the practical requirements of industrial development.

Below a summarised timeline of hemp’s history both in South Africa and globally is provided.<sup>9</sup>



- Globally, hemp evolved from one of the world’s earliest domesticated crops into a modern industrial resource.
- In South Africa, decades of research and trial- with little commercial progress- delayed industry growth, recent reforms now position hemp as a key player in sustainable development and decarbonization.

**Figure 1: History of hemp**

With decades of trial and research behind it, South Africa now stands at the threshold of fully integrating hemp into its sustainable development ambitions.

<sup>8</sup> Camila Joan Coogan (2016). The South African hemp story: saviour crop or business as usual? Thesis presented in partial fulfilment of the requirements for the degree of Master of Philosophy in Sustainable Development in the Faculty of Economic and Management Sciences at Stellenbosch University.

<https://scholar.sun.ac.za/server/api/core/bitstreams/9c1438fc-5c37-44a6-9e52-acdc02b361c8/content>

<sup>9</sup> Source: FOHSA

## 1.5. Why Hemp is Prized

Hemp's strategic value lies not in a single product or end use, but in the distinct characteristics of its constituent parts. The crop is inherently segmented by plant component and intended application, with (I) inflorescences, (II) grain, (III) stalk biomass, and (IV) chemical constituents each serving different markets and requiring different cultivation, harvesting, and processing approaches. These components are not interchangeable: decisions taken at the cultivation stage determine which plant parts are optimised, the volumes and qualities produced, and which processing pathways and end uses become viable.

Understanding hemp as a collection of differentiated components - rather than a uniform commodity- reveals the technical and economic trade-offs that shape development choices and explains why successful deployment depends on alignment across genetics, farming practices, processing infrastructure, and market demand.

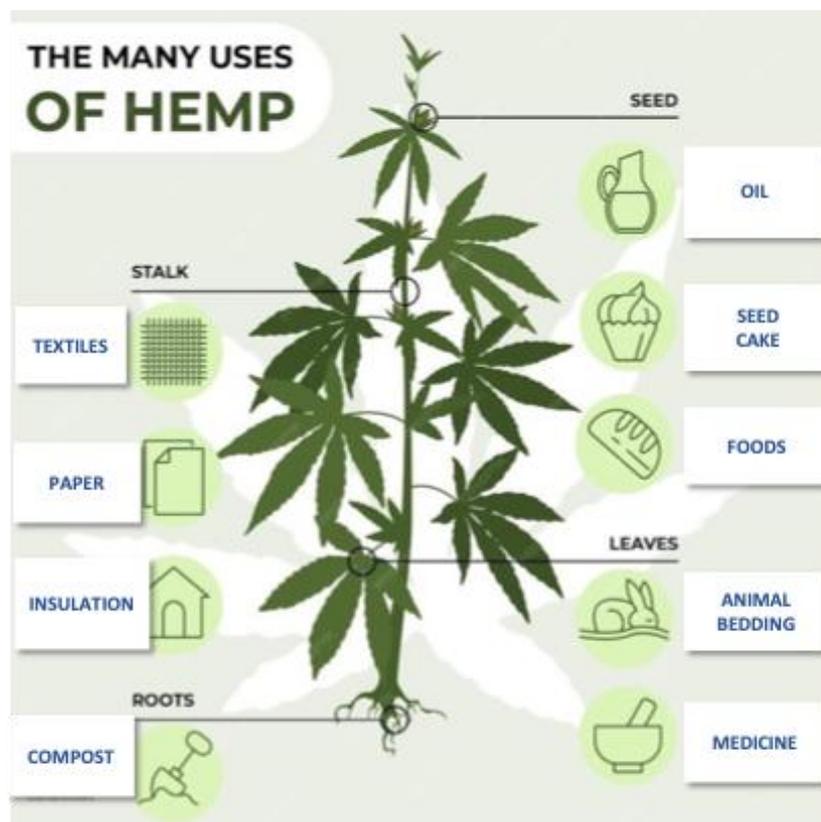


Figure 2: The many uses of hemp<sup>10</sup>

Hemp's multi-use profile gives it a unique role as a strategic industrial crop - one capable of contributing simultaneously to economic diversification, sustainable manufacturing, and low-carbon agricultural systems.

<sup>10</sup> Zageta Analysis; FOHSA.

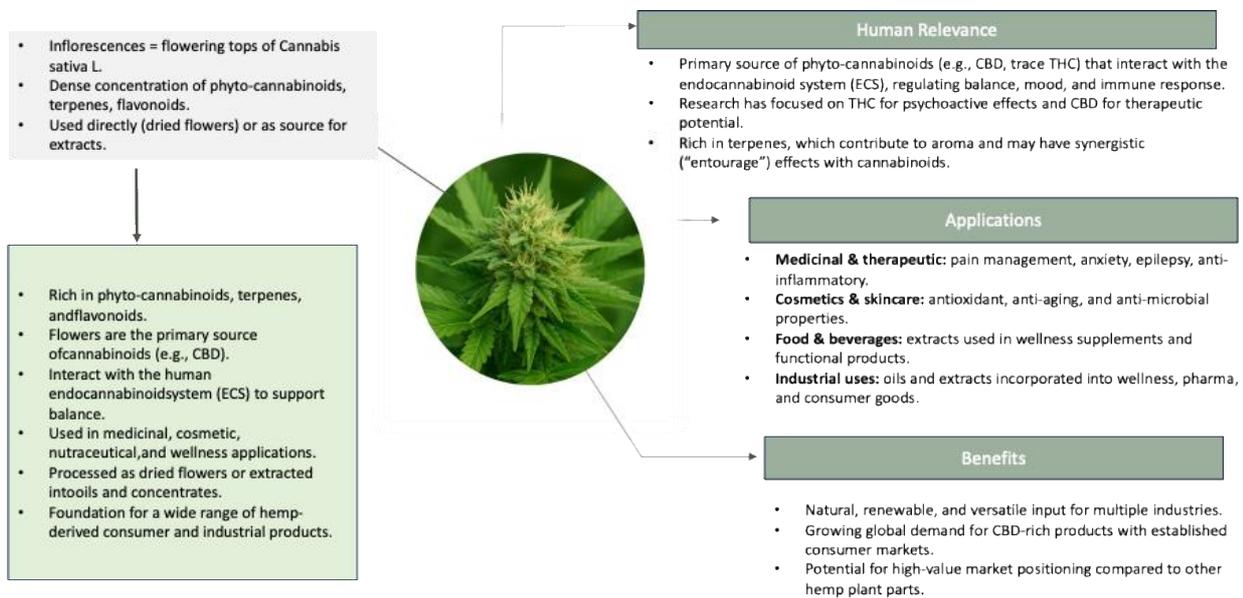
---

## HEMP FLOWER

---

Hemp inflorescences contain high concentrations of cannabinoids, terpenes, and flavonoids—compounds that interact with the human endocannabinoid system and underpin their use in medicinal, therapeutic, cosmetic, nutraceutical, and wellness applications.<sup>11</sup> These bioactive compounds are concentrated primarily in the flowering tops, making inflorescences the most chemically valuable part of the plant on a per-unit basis.

Hemp flower may be consumed directly in dried form or processed into a range of extracts, which are then incorporated into various hemp-derived products, whether medicinal or non-medicinal. While inflorescences represent only a small proportion of total plant biomass, their functional concentration and market demand make them a strategically important output in flower-oriented production systems.



**Figure 3: Unique features of inflorescences<sup>12</sup>**

---

## HEMP GRAIN

---

Hemp seed has been consumed for millennia and remains a highly nutritious food source. Its balanced protein profile, high oil content, micronutrient density, and abundance of omega fatty acids position it as a valuable input for human nutrition, wellness, and broader food systems. These attributes support its use in a wide range of food and ingredient applications, from whole seed and oils to flours and protein products.

<sup>11</sup> Pellati F, Brighenti V, Sperlea J, Marchetti L, Bertelli D, Benvenuti S. New Methods for the Comprehensive Analysis of Bioactive Compounds in *Cannabis sativa* L. (hemp). *Molecules*. 2018 Oct 14;23(10):2639. doi: 10.3390/molecules23102639. PMID: 30322208; PMCID: PMC6222702.

<sup>12</sup> Zageta Analysis; FOHSA; FIHO; EIHA; Interviews with Stakeholders. See bibliography for full list.

Beyond its nutritional value, hemp grain is prized for its compatibility with sustainable agricultural systems. The crop’s relatively low input requirements, combined with positive effects on soil structure and health, reinforce its relevance within modern agro-ecological and food security contexts. Together, these characteristics underpin hemp grain’s renewed importance as both a historical and future food crop.<sup>13</sup>

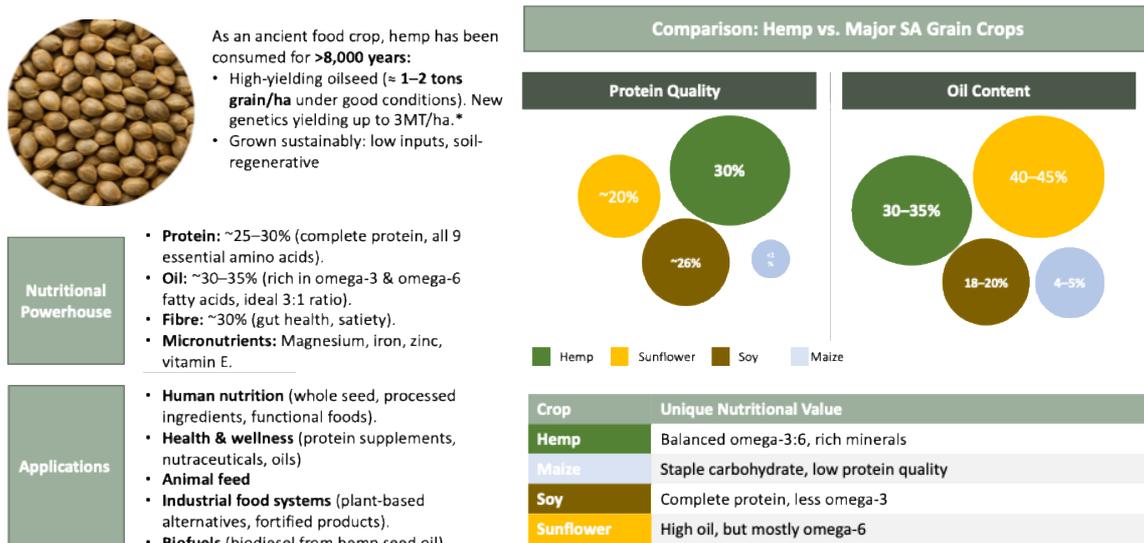


Figure 4: Hemp and Nutrition<sup>14</sup>

## HEMP STRAW AND FIBRE

Hemp straw is prized for two primary reasons. First, it can be separated into multiple distinct components, each of which is marketable once processed. Second, among these components, the bast fibres are particularly valued due to their high cellulose content and favourable material properties.

Hemp belongs to the bast fibre category, alongside flax, jute, and kenaf, and is characterised by a two-layer stalk structure comprising outer bast fibres and an inner woody core known as hurds or shivs. Hurds make up the majority of the straw’s weight and are lightweight, breathable, largely pest-resistant, and highly absorbent. These properties make them suitable for applications such as animal bedding, building materials, insulation, and biochar production.

Bast fibres, while comprising a smaller proportion of total stalk mass, represent the higher-value fraction and can constitute up to approximately 35% of the straw. Their strength, durability, breathability, biodegradability, and high cellulose content make them suitable for use across textiles, packaging, industrial materials, pharmaceutical applications, food and beverage uses, and other

<sup>13</sup> Tănase Apetroaei V, Pricop EM, Istrati DI, Vizireanu C. Hemp Seeds (*Cannabis sativa* L.) as a Valuable Source of Natural Ingredients for Functional Foods-A Review. *Molecules*. 2024 May 1;29(9):2097. doi: 10.3390/molecules29092097. PMID: 38731588; PMCID: PMC11085560.

<sup>14</sup> Zageta Analysis; FOHSA; FIHO; EIHA; Interviews with Stakeholders – See references for full list.

sectors. Residual dust and fines generated during processing can also be repurposed into fertilisers, briquettes, and bio-based materials, enabling near-complete utilisation of the straw where appropriate processing pathways exist.<sup>15</sup>

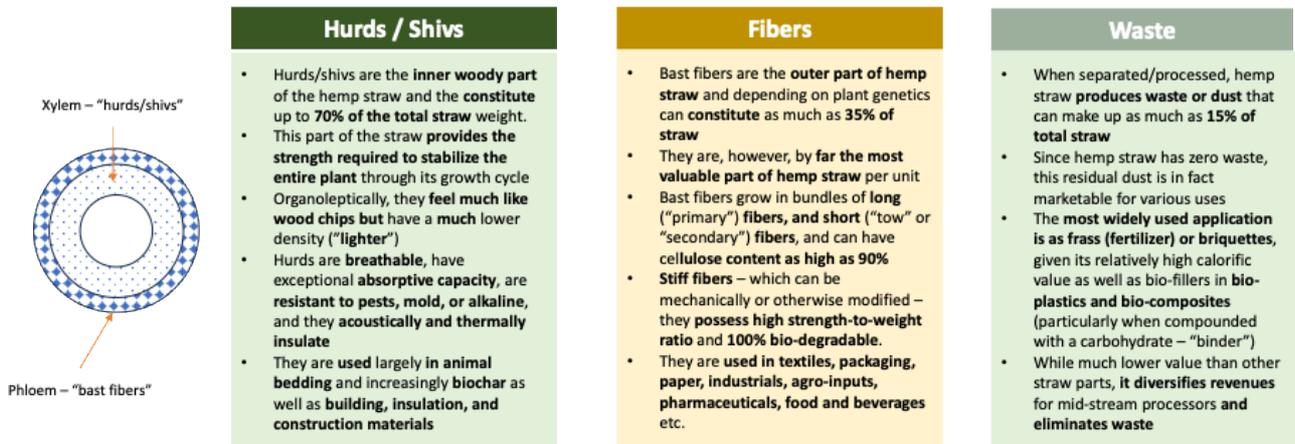


Figure 5: Hemp Stalk<sup>16</sup>

## HEMP CHEMICAL CONSTITUENTS

Hemp’s industrial importance is rooted in the chemical composition of its stalk, which consists primarily of cellulose (approximately 50 - 70%; much higher for fibres separates from hurds), hemicellulose (around 15 - 25%), and lignin (roughly 10 - 15%). This composition positions hemp as a highly versatile feedstock for modern bio-refinery systems capable of producing multiple material, chemical, and energy outputs from a single crop.

Cellulose, as the dominant component, underpins established applications such as pulp and paper, packaging, textiles, and bio-based composites, and also provides a foundation for more advanced materials at higher levels of processing. Hemicellulose supports conversion into a range of bio-based intermediates, including fuels, plastics, and adhesives, due to its flexible chemical structure. Lignin contributes binding properties within the plant and can be utilised as an energy source or as a precursor for resins, carbon-based materials, and other value-added chemicals.

Taken together, these constituents enable hemp to support integrated production systems that maximise material utilisation and reduce reliance on fossil-based inputs. This chemical profile explains why hemp is increasingly viewed not simply as an agricultural crop, but as a strategic

<sup>15</sup> A T M Faiz Ahmed, Md Zahidul Islam, Md Sultan Mahmud, Md Emdad Sarker, Md Reajul Islam, (2022). Hemp as a potential raw material toward a sustainable world: A review. Heliyon, Volume 8, Issue 1, 2022. e08753. ISSN 2405-8440. <https://doi.org/10.1016/j.heliyon.2022.e08753>

<sup>16</sup> Zageta Analysis; FOHSA; FIHO; EIHA; Interviews with Stakeholders – See references for full list.

industrial input with relevance for resource efficiency and circular, bio-based industrial development.<sup>17</sup>

### **Key Takeaways from Chapter 1**

Chapter 1 serves a deliberately grounding purpose: to demystify what hemp is, clarify what it is not, and situate it within both global history and South Africa's own context. Although hemp is botanically the same species as dagga or marijuana, the chapter demonstrates that this similarity has often obscured far more important distinctions related to purpose, plant part, chemical composition, and end use. These distinctions matter, because they determine whether cannabis is treated as an intoxicating substance or as an agricultural and industrial crop. Understanding hemp therefore begins not with novelty, but with clarity.

The chapter establishes that hemp is not a new or experimental crop. It is one of the world's oldest domesticated plants, with more than 8,000 years of documented use and deep linkages to early industrial development. For much of human history, hemp was a foundational resource, providing fibre, food, fuel, and materials essential to everyday life and economic activity. Its temporary disappearance from mainstream agriculture in the 20th century reflects regulatory and political choices rather than any decline in utility.

South Africa's own relationship with hemp is longer and more substantial than is often recognised. Formal cultivation and research efforts began in the early 1990s and were supported at the highest political levels, yet commercial development was constrained for decades by regulatory uncertainty and conflation with intoxicating cannabis. This mirrors global trends, where industrial hemp was caught within restrictive drug-control frameworks despite being explicitly excluded from international narcotics conventions.

The chapter also explains why hemp is re-emerging now. Around the world, governments are revisiting historical distinctions between hemp and intoxicating cannabis, driven by sustainability priorities, demand for renewable materials, and the need for more resilient agricultural and industrial systems. These shifts have restored hemp's legitimacy as an agricultural commodity and reopened pathways for its use across manufacturing, construction, food systems, and bio-based industries.

Taken together, Chapter 1 confirms that hemp is neither foreign nor fringe. It is a well-understood plant with deep historical roots, renewed global relevance, and clear alignment with South Africa's contemporary development objectives (Hemp was identified as a government priority sector 6 years ago), including diversification, inclusion, and decarbonisation. Before engaging with detailed market analysis or prioritisation, the chapter establishes a simple but critical point: hemp is a crop that merits serious interest, informed consideration, and deliberate policy attention in the South African context.

---

<sup>17</sup> Pannipa Chaowana, Warinya Hnoocham, Sumate Chaiprapat, Piyawan Yimlamai, Korawit Chitbanyong, Kapphapaphim Wanitpinyo, Tanapon Chaisan, Yupadee Paopun, Sawitree Pisutpiched, Somwang Khantayanuwong, Buapan Puangsin (2024). Utilization of hemp stalk as a potential resource for bioenergy. *Materials Science for Energy Technologies*, Volume 7, 2024, Pages 19-28. ISSN 2589-2991. <https://doi.org/10.1016/j.mset.2023.07.001>.

# Ch 2: Value Chain Assessment

---

Understanding the hemp sector requires a structured lens through which its diverse uses, regulatory environment, and industrial potential can be viewed. Hemp is a multifaceted crop with an unusually wide array of applications, but this diversity (as well as its conflation with more popular “dagga”) also creates complexity, competing priorities, and capability constraints. As such, a value-chain assessment has been selected to lay a common understanding about how, broadly, value is created at different stages of the hemp supply chain and the associated implications on the enabling requirements to ensure its success. To do that, a segmented, demand-led value chain framework was employed that helps the reader navigate this complexity and, most importantly, lays out the foundation for targeted policy interventions, industrial planning, and commercialisation strategies later discussed in this report.

To that end, this chapter begins with a re-orientation of the supply chain, beginning first with demand and then “working” backwards to outline requirements for vertical coordination (whether industrial design, investment, or standards) from upstream to downstream. It then brings forward a segmented framework based on the end-uses or applications of hemp called the 5-Fs+F framework (adapted from FOHSA and CHTA). The subsequent sections build on these lenses to introduce the local hemp ecosystem and provide a detailed value chain assessment from upstream seed supply, on-farm cultivation, midstream processing to downstream manufacturing. This work is primarily based on high-level desktop research, however qualitative interview data from engagements with local hemp stakeholders across the different value addition stages has been incorporated to validate the findings per value chain segment.

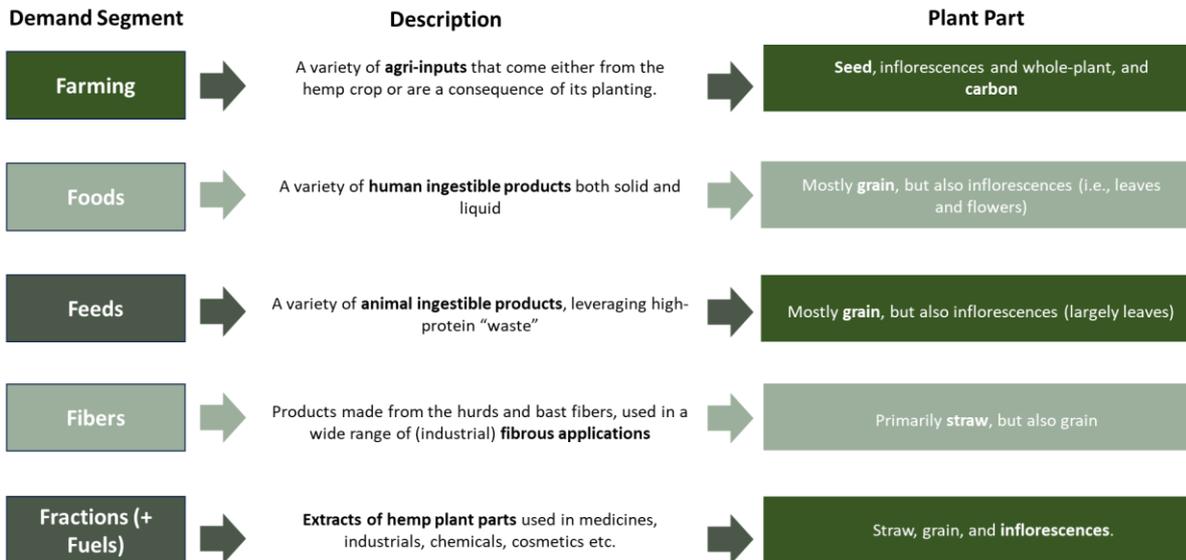
## 2.1. Hemp Market: Demand and the 5F Framework

---

As noted in detail in Chapter 1, the versatility of hemp’s marketable plant parts gives producers the opportunity to convert the plant into many (ubiquity) and highly varied (diversity) types of products ranging from foods and beverages, textiles, and construction materials to cosmetics, paper, and fuels.

By extension, each one of these end-uses, which are called a “demand pathway”, has its own sets of unique plant parts, technical requirements, standards, investment requirements, risks and opportunities, regulatory frameworks etc. That is, the ubiquity and diversity of hemp and hemp-derived products, often lauded as a positive, also adds unnecessary complexity to an environment where there remains a large knowledge deficit generally and, specifically, a large knowledge asymmetry between operators and investors and regulators.





Source: Zagea Analysis; FOHSA.

28

Figure 7: The 5Fs Segmentation<sup>20</sup>

Applying this segmentation to the hemp-sector better organises the understanding of these nuances and identifies the potentially differentiated interventions each segment may require.

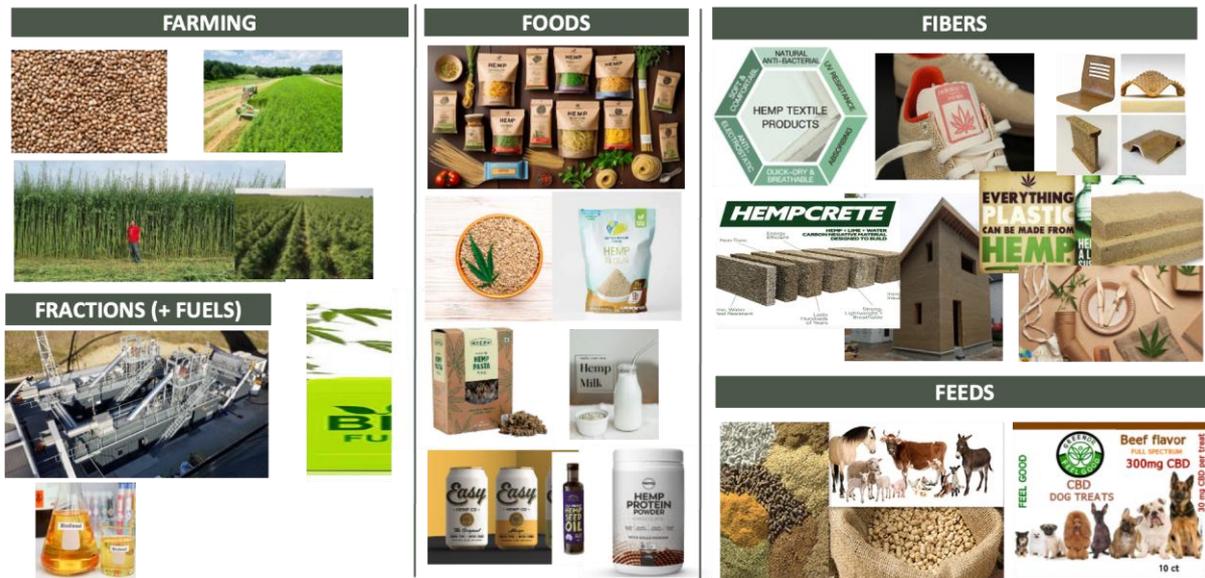


Figure 8: A Segmented Hemp Universe<sup>21</sup>

<sup>20</sup> Image source: Zagea Solutions, 2025.

<sup>21</sup> Ibid.

Given that hemp is planted with a specific end-use in mind (e.g., for use in textiles, medicines, or plastics), it also implies, as seen in Chapter 1, the demand for a specific plant part (e.g., fibre or grain) used for that application, aligning the plant's natural composition with the specific demand pathways it serves - notwithstanding that some plant parts can be employed for more than a single end-use, although not simultaneously. This framing provides a consistent structure for interpreting downstream technologies, manufacturing processes, and regulatory requirements discussed in later sections and Chapters.

Finally, "Finally, alongside the demand-led view, it is necessary to re-orient the supply chain perspective to ensure alignment between the two. Hemp is not yet a commodity in a classic sense and its trade is based on private treaty where a series of end-users inform all requirements for desired products across various stages of value addition, and in many cases right down to specific genetics planted by farmers. In South Africa, industrial policy intervention with regards to hemp has almost exclusively been supply-led, with a focus on liberalising agricultural production (and permits issued - see section 2.2.2. "On-Farm - Cultivation" further below) but with less consideration for associated demand requirements and enablers to guarantee access to that demand. This approach presents several undesirable limitations, chief among them being a potential misalignment between what farmers grow and what markets demand, often leaving farmers at risk of losses due to unmarketable farm-gate prices. Additionally, it also misses the opportunity to leverage demand stimulation and associated policy interventions as critical enablers of supply chain development, not least in a nascent sector such as hemp.

As such, a "vertically-coordinated" or "flipped" supply chain that begins first with demand (i.e., end-use products/applications) and emphasises that decisions made at every stage of the value chain is presented - from genetics selected, cultivation methods, processing capabilities, manufacturing requirements and standards - must be guided by the requirements of the final product. By starting with demand, the value chain can be structured in a way that aligns capabilities, resources and investments with actual market opportunities. This ensures coherence, reduces misalignment, and supports the development of competitive and viable pathways across the 5F framework. Below is a simplified, graphic representation of the holistic demand-oriented hemp-value chain (focused only on mainstream vs. side-stream activities). This framework is used to specifically structure the rest of this Chapter 2 as well as more generally to inform other Chapters in this paper.

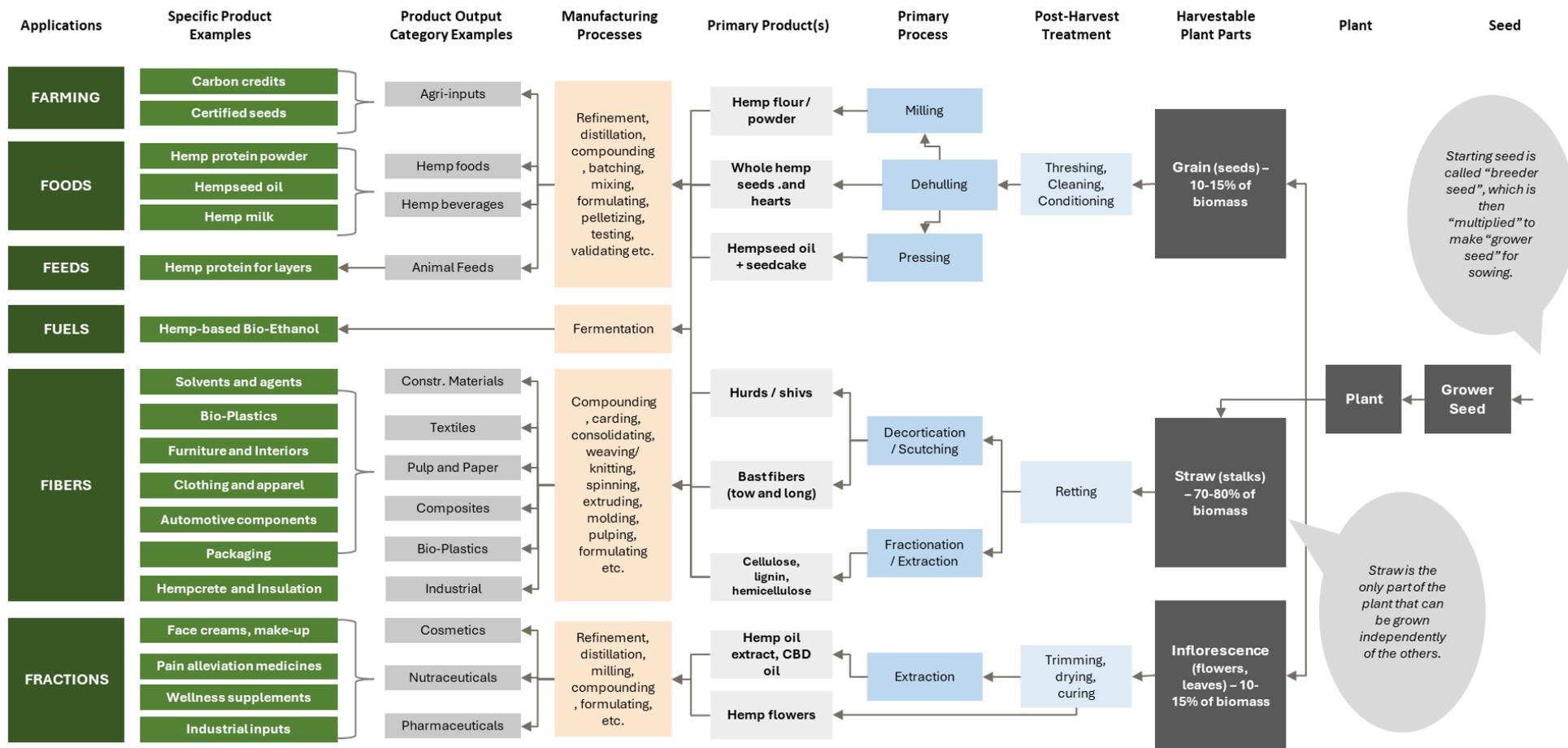


Figure 9: Demand-led Hemp Value Chain<sup>22</sup>

<sup>22</sup> Image source: Zageta Solutions 2025, adapted from FOHSA.

## 2.2. Value-Chain Assessment

---

Based on the framing in the preceding section, this section shifts focus towards an assessment of each stage of the holistic supply chain, with varying emphasis depending on the criticality of considerations or relative importance. This assessment is informed both by extensive desktop research and subject matter expert interviews and is divided into four sections.

- 1) **Upstream:** a detailed review of only the seed supply system, with a focus on how seed is commercialised from breeding to marketing. The relative focus of first subsection is informed by the Study's commissioners.
  - 2) **On-Farm:** primary production activities, with a focus on key demand and activity, regulatory environment, growing considerations, the role of straw, and pricing. This section also includes a statistical and spatial review of hemp permits issued by the Department of Agriculture between 2022 and August 2025.
  - 3) **Mid-stream:** primary processing activities, with distinctions based on the plant parts used as an input feedstock (e.g., grain vs. straw), and a focus on "missing middle" capabilities.
  - 4) **Downstream:** finally, manufacturing and marketing activities, with a high-level review of 5 priority demand pathways (expanded in more detail in Chapters 3 to 5).
- 

### 2.2.1. UPSTREAM - A SUSTAINABLE SEED SUPPLY SYSTEM

---

The upstream part of the hemp value chain relates largely to activities that develop the primary inputs used for cultivation including mechanisation, agro-chemicals, and propagating materials such as seeds. Given demand (i.e., assuming that a specific end-use is known), genetic selection is the first consideration in cultivating the plant parts require for downstream use as understanding how these genetics are developed is critical for understanding the mechanics of the supply chain. It is noted that agro-chemicals also play an important role in cultivation, but currently the Department of Agriculture has not updated any list of approved chemicals for use in hemp production. Further, mechanisation is also another important input, but South Africa relies heavily on imported agricultural machinery - there are implications of this discussed in more detail in Chapter 5, but this is an area that may benefit from leveraging similar research in other agricultural sub-sectors. By comparison, however, South Africa has a very well-established local seed sub-sector covering a range of commodities, but there is also public sector track record specifically in hemp breeding dating back more than 20 years. Of course, South Africa is also home to many Cannabis varieties, including low-THC ones that present potential for commercialisation if appropriately exploited and resourced. Finally, traits endowed by varieties of hemp have implications not only for maximising the productivity of desired plant parts at the farm-level (e.g. higher grain yield) but also the downstream production efficiency (e.g., thinner straw to reduce processing effort), with both economic and quality considerations.

As such, this section focuses specifically and exclusively on seed. It does so through a 4-part exploration - with information and insights drawn from primary desktop research, author knowledge, and subject matter expert engagements - that includes:

- I. **Objectives of seed development**, with a focus on what constitutes a sustainable seed supply system
- II. **Guiding regulations**, with a focus on both international treaties/conventions as well as South Africa-specific seed legislation
- III. **Access to seed**, with a focus on implications of international (importing) or local sourcing
- IV. Finally, an outline of the resource-intensive end-to-end **seed commercialisation process**, from breeding to market, along with the current status in and prospects for South Africa

## I. What Makes a Seed System Sustainable?

The ultimate goal of seed production is to ensure a sustainable supply of seeds essential for growing food and industrial crops that sustain people and drive economies. This relentless demand fuels genetic development focused on continuously improving specific traits in hemp, offering farmers varieties that boost productivity, enhance resilience, maximise genetic diversity, and reduce biosecurity risks. Seeds are the indispensable starting point for nearly every agricultural system worldwide, forming the base upon which global food and industrial production depend.<sup>23</sup>

To meet this goal, four key pillars or requirements must be met:

- i. **Sufficiency**: seed supply must maintain sufficient stocks of continuously improved varieties that offer a broad diversity of choices and are resilient to shocks.
- ii. **Affordability**: These seeds need to be affordable, allowing farmers to plant without undue financial strain, and accessible,
- iii. **Accessibility**: delivered through efficient supply chains close to where farmers operate.
- iv. **Quality**: above all, the genetics must perform consistently well, minimising inputs (costs) and risks while maximising outputs (returns).

In ensuring the goal, South Africa policy makers need to appreciate three fundamental considerations, supported by engagements with South Africa's leading seed association:

- A. **Output demand**: Seed development is fundamentally driven by demand for specific downstream products - referred to as the "five Fs" and various demand pathways. Breeders face the challenge of balancing these downstream product requirements with the economic realities faced by farmers, including yield potential and cost intensity. This balancing act is an ongoing, iterative process of enhancement and innovation that aligns seed genetics with shifting market demands.
- B. **Genetic development**: Breeders utilise a range of technologies to source, select, and develop varieties suited to demand (some of which may be prohibited in certain jurisdictions), all while preserving genetic purity and diversity. They must also ensure that hemp varieties can adapt to diverse local conditions, where performance may vary widely given differing agri-climatic conditions. Moreover, managing biosecurity risks - from pests and diseases - and safeguarding biodiversity are critical national concerns throughout this process; the process<sup>24</sup>

---

<sup>23</sup> Louwaars, N. P., & Manicad, G. (2022). Seed Systems Resilience - An Overview. *Seeds*, 1(4), 340-356. <https://doi.org/10.3390/seeds1040028>

<sup>24</sup> Salgotra RK, Chauhan BS. Genetic Diversity, Conservation, and Utilization of Plant Genetic Resources. *Genes (Basel)*. 2023 Jan 9;14(1):174. doi: 10.3390/genes14010174. PMID: 36672915; PMCID: PMC9859222.

C. **Returns:** Commercialising improved seeds is a lengthy and costly endeavour, often taking as many as 15-20 years and tens, if not millions, of Rand in investment. The promise of viable returns is essential to incentivise this investment, making intellectual property protection a critical element. While jurisdictions, including South Africa, protect breeders' rights, they also often allow for free and fair use of this intellectual property by certain groups, such as indigent farmers, particularly for staple crops. This balance between protection and access shapes the framework within which seed commercialisation operates.<sup>25</sup>

## II. The (High Level) Hemp Seed Regulatory Environment

The seed sector is governed and shaped by a combination of both international treaties/conventions and national legislation, each addressing critical aspects from genetic resources to intellectual property and biosecurity. On the international stage, three primary agreements set the framework. First, the International Treaty on Plant Genetic Resources for Food and Agriculture (ITPGRFA)<sup>26</sup> focuses on conserving plant genetic diversity and recognising farmers' rights. Second, the International Convention for the Protection of New Varieties of Plants, administered by the International Union for the Protection of New Varieties of Plants (UPOV)<sup>27</sup>, oversees intellectual property rights for plant breeders, with important connections to the World Intellectual Property Organisation (WIPO). Third, the International Plant Protection Convention (IPPC)<sup>28</sup> regulates pest control measures for plant products, including seeds, to safeguard agricultural health globally.

Within South Africa, a robust set of seed regulations align with these international commitments and here the focus is on the four key regulations, namely (1) the Plant Improvement Act (No 11 of 2018), which governs variety denominations and lists, establishes seed certification schemes, prohibits the sale of uncertified seed, and sets requirements for seed quality; complementing this is (2) the Plant Breeder's Rights Act (No 12 of 2018), which provides the legal framework for granting, registering, and protecting breeders' rights over new plant varieties, including provisions for licensing and enforcement as well as incidental matters; (3) the Agricultural Pests Act (No 36 of 1983), which addresses the prevention and control of agricultural pests, regulates the importation of controlled food products including seeds, and manages quarantine organisms. Lastly, (4) the Genetically Modified Organisms Act (No 15 of 1997), which promotes responsible development, production, and use of GMOs, sets standards for environmental risk evaluation, and regulates genetic modifications involving recombinant DNA, except for human gene therapy. Together, these international and national regulations form a comprehensive environment that supports the sustainable development, protection, and safe use of seeds in South Africa.

---

<sup>25</sup> Crop Life International. (2022). Report: Cost and Time Required for the Discovery, Development and Authorisation of a New Plant Biotechnology-Derived Genetic Trait. <https://croplife.org/wp-content/uploads/2022/05/AgbiolInvestor-Trait-RD-Branded-Report-Final-20220512.pdf>

<sup>26</sup> <https://www.fao.org/plant-treaty/en/>

<sup>27</sup> <https://www.upov.int/en/about-upov/overview>

<sup>28</sup> <https://www.ippc.int/en/>

### III. Hemp Seed Sourcing (Access)

Access to seed is fundamental to the South African hemp sector, which relies on two primary sourcing options. The first is importing seed varieties from international markets, with the European Union - particularly France - being the most common source, alongside increasing imports from North America, China, and Australia. The second option involves sourcing from South African-bred varieties listed on the national registry. Each route carries important considerations that shape policy choices and practical options.<sup>29</sup>

*"We imported seed worth R4 million last year - from Canada, France, and China. The government paid for seed to plant about 114 hectares." (Int 18, South African Farmer Association).*

When sourcing from abroad, the Plant Improvement Act (PIA) restricts farmers from growing or commercialising seeds not approved on the national varieties list. However, it allows for the importation of "unregistered" varieties under specific conditions, similar to the Section 21 authorisation used for unregistered medicines like medical cannabis.<sup>30</sup>

Since no hemp varieties are yet approved and listed locally, permit holders in South Africa can obtain import permits to source limited quantities of these unregistered varieties from abroad. This import process tends to be costly, driven by the generally higher price of hemp seed relative to other oilseeds, small-scale purchases by farmers that limit economies of scale, the need for phytosanitary compliance to protect South Africa's biosecurity, quality assurance on their production, as well as landing and clearing costs. Farmers must also navigate a long supply chain: seed suppliers rarely hold large seed inventories, requiring pre-orders well in advance of planting seasons, followed by complex logistics involving port clearance and last-mile distribution.

*"Until there's a real demand, companies won't produce in big volumes, they don't want to sit with stock." (Int 21, South African Seed Producer Association)*

Moreover, the adaptation of imported genetics to South African agro-climatic conditions remains a crucial factor for farmers since this has a direct impact on performance (e.g., low germination rates, THC stability in the cultivated crop, or lower than expected yields). Currently, it is unclear whether imported seeds currently used by South Africa hemp farmers have been assured for quality through certification in their source countries not whether this requirement exists and or is enforced.

Locally, the alternative is to source from South African-bred varieties. Research and stakeholder

---

<sup>29</sup> <https://www.accesstoseeds.org/countries/>

<sup>30</sup> Medicines and Related Substance Act (Act 101 of 1965. Section 21:

21. Authority may authorise sale of unregistered medicines, medical devices or IVDs for certain purposes(1) The Authority may in writing authorise any person to sell during a specified period to any specified person or institution a specified quantity of any particular medicine, medical device or IVD which is not registered.

(2) Any medicine, medical device or IVD sold in pursuance of any authority granted under subsection (1) may be used for such purposes and in such manner and during such period as the Authority may in writing determine.

(3) The Authority may at any time by notice in writing withdraw any authority granted in terms of subsection (1) if effect is not given to any determination made in terms of subsection (2). [S 21 amended by s 19 of Act 65 of 1974; substituted by s 20 of Act 72 of 2008.

engagement reveal that no formally approved and listed hemp varieties currently exist although several submissions are pending approval (see more detail further below). While local “landraces” may be present, there is little publicly available information on their adaptation, stability, uniformity, or ownership and to the author’s knowledge none have yet been formally commercialised.

*“There is no local seed, and we have little input with breeders like ARC. We are dependent on what comes and on the buyers’ preferences.” (Int 18, South African Farmer Association).*

South Africa has only one known public hemp breeding program, with genetics submitted for breeder’s rights and varietal listing, and limited known private sector breeding activity. Breeding is a long and costly process - taking up to 15 years and an investment in the tens, if not hundreds, of millions of Rand. In the short term, importing unregistered seed appears inevitable. However, this reliance on imports may discourage or crowd-out local breeding since unregistered imported varieties can capture local market share without bearing the associated costs and regulatory burdens of local registration. That said, local sourcing may also come from the local production or “multiplication” of hemp varieties bred and/or owned internationally through IP-protected agreements (see further below for more details).

*“Demand should dictate to seed companies what they need - the offtake must specify what kind of fibre or oil or grain the end product needs.” (Int 21, South Africa Seed Producer Association)*

Whether this dynamic will create a sufficiently enabling environment to stimulate local breeding in the long term remains uncertain, as other broader factors also influence breeding investment and development (these are also considered in Chapters 5 and 6).

#### **IV. Seed Commercialisation Process**

This sub-section shows the full pathway of hemp seed commercialisation, outlining the key stages from breeding and protection through to registration, certification, production, and marketing. It highlights how genetic traits are developed and safeguarded, how new varieties are brought to market, and the systems in place to ensure seed quality and availability for farmers.

By detailing each step including breeding methods, intellectual property rights, regulatory requirements, seed multiplication, and distribution, this overview provides insight into the complex processes of the hemp seed industry. While not an exhaustive technical guide, it draws together critical information on the regulatory framework, market players, and challenges shaping the commercialisation of hemp seed locally.

The seed commercialisation process, from selecting and breeding genetics to distributing at scale, is an extremely long one of up to 15 years, requiring several steps. While displayed here in sequence, in reality some of the steps can be undertaken concurrently. Figure 10 below provides an overview of these stages, while subsequent sub-sections dive deeper into each.

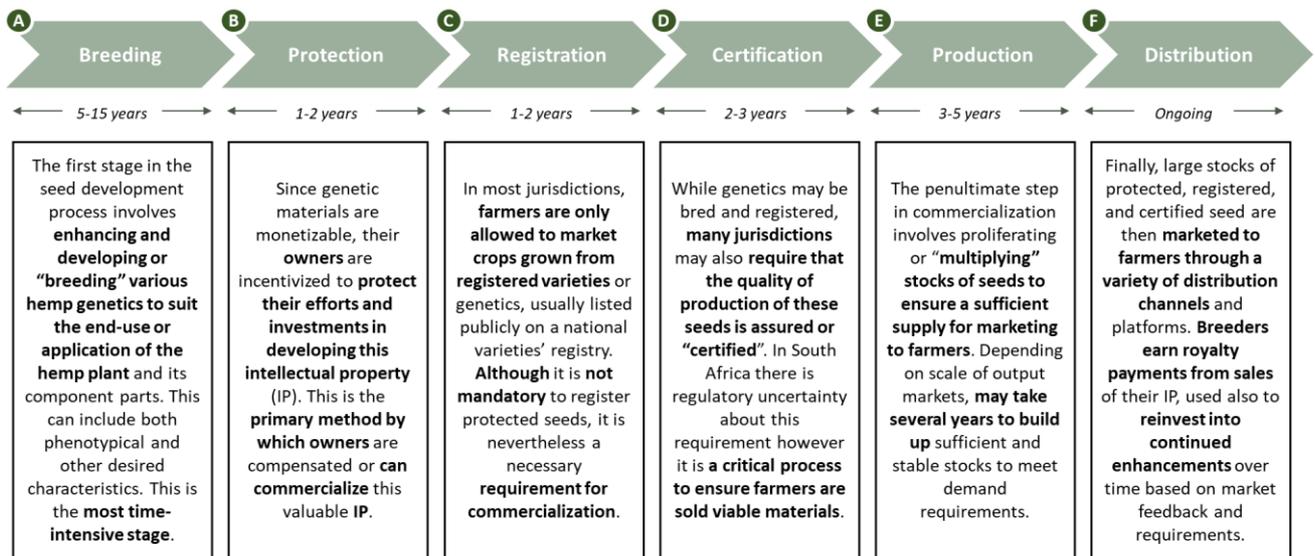


Figure 10: Stages of Seed Commercialisation (High Level)<sup>31</sup>

## A. Seed Commercialisation: Breeding

Breeding dates to the first-time human beings domesticated wild species for farming. According to many sources, hemp was domesticated as far back as 12,000 years ago (before even wheat domestication in the Neolithic period - roughly 10,000 years ago) and it has been enhanced over millennia to suit the needs of industry and mankind.<sup>32</sup>

Mendel’s (1866)<sup>33</sup> seminal work describing the inheritance of traits from one generation to the next precipitated accelerated breeding activity, with improving technologies as the science of genomics (animal/human or plant) expanded throughout the 20th century (e.g., discovery of double helix of DNA, human genome sequencing, GMOs etc.).

<sup>31</sup> Image source: Zageta Solutions 2025, using information from the International Seed Federation, South African National Seed Organisation (SANSOR); South Africa Department of Agriculture and stakeholder interviews.

<sup>32</sup> Clarke, R. C., & Merlin, M. D. (2016). *Cannabis* Domestication, Breeding History, Present-day Genetic Diversity, and Future Prospects. *Critical Reviews in Plant Sciences*, 35(5–6), 293–327.

<https://doi.org/10.1080/07352689.2016.1267498>

<sup>33</sup> Mendel, G. (1866). "Versuche über Pflanzen-Hybriden" ["Experiments on Plant Hybridization"]. *Verhandlungen des Naturforschenden Vereins in Brünn*, 4: 3–47. (Note that while Mendel conducted his experiments and presented his findings in 1865, the paper was published in 1866.)

Genetic enhancement or development is primarily driven by demand for final products. These final products possess sets of desired traits that end-users (whether farmers or downstream operators) seek to maximise. The following are just a few examples of key desired traits: productivity (yields of desired plant parts), resistance to pests and diseases, resistance to climatic shocks (droughts, floods), intensity of input consumption (whether water, chemicals, or others), THC stability (critical in most jurisdictions), physical features (size, shape, colour, smell etc.).<sup>34</sup>

*“Future growth depends on offtake-driven breeding - downstream industries must define what they need from hemp varieties.”*

*(Int 21, South African Seed Producer Association)*

Plant breeding broadly falls into two categories: traditional and modern techniques. Traditional breeding relies on time-tested methods like cross-breeding and hybridisation over multiple generations, while modern approaches employ advanced “new breeding techniques” (NBTs) such as gene editing and marker-assisted selection. These include transgenic methods - where genes are transferred from different species - and intragenic methods that edit genes within the same species. Notably, South Africa treats genetically modified organisms (GMOs) and NBTs the same, unlike many other countries where the latter are often subject to lighter regulation and lower costs.<sup>35</sup>

Breeding is a complex, multidisciplinary, and iterative process that can take as many as 20 years. Developing a single stable, pure breeding line can cost upwards of US\$10 million, reflecting the extensive expertise and resources needed.<sup>36</sup> Open-pollinated varieties (OPVs) offer the advantage of seed saving for the next season, bringing down input costs and encouraging genetic diversity. In contrast, hybrid varieties, which are known for higher yields, uniformity, and traits like disease resistance, cannot be saved due to genetic segregation, requiring farmers to purchase new seed each season.<sup>37</sup>

The global seed market is highly concentrated, with 40-50% controlled by U.S.-based companies. Breeding hubs are geographically clustered in the U.S., the European Union, and Japan in the northern hemisphere, while Brazil, Chile, and Argentina provide counter-seasonal supply in the south. South Africa, however, does not yet occupy a significant place in this landscape and lacks a clear comparative advantage.<sup>38</sup>

Though breeding activity is growing in East and Southern Africa, South Africa’s market remains relatively underdeveloped, with only a small number of private and public companies actively engaged in local breeding. On the public side, the Agricultural Research Council (ARC) leads the way with over 20 years of

*“If there’s a demand, if there’s money to be made, innovation follows immediately.”*

*(Int 21, South Africa Seed Producer Association)*

---

<sup>34</sup> Shiels, D., Prestwich, B. D., Koo, O., Kanchiswamy, C. N., O'Halloran, R., & Badmi, R. (2022). Hemp Genome Editing- Challenges and Opportunities. *Frontiers in genome editing*, 4, 823486. <https://doi.org/10.3389/fgeed.2022.823486>

<sup>35</sup> Anand, A., Subramanian, M., Kar, D. (2022). Breeding techniques to dispense higher genetic gains. In: *Frontier Plant Science*, 19 January 2023. Sec. Plant Bioinformatics. Volume 13 - 2022 | <https://doi.org/10.3389/fpls.2022.1076094>

<sup>36</sup> Interview 8: Breeder/Seed Producer

<sup>37</sup> Kutka, F. (2011). Open-Pollinated vs. Hybrid Maize Cultivars. In: *Sustainability* 2011, 3, 1531-1554. ISSN 2071-1050. doi:10.3390/su3091531

<sup>38</sup> <https://www.accesstoseeds.org/countries/>

hemp research and runs the continent's only known public hemp breeding program. Other universities like the Free State, North-West, and KwaZulu-Natal have some involvement, though their hemp breeding experience is not well documented.

Currently, only two locally bred hemp varieties have been publicly registered: ARCAN-001 and ARCAN-003, both developed by the ARC primarily for straw and fibre production, but also suitable for dual-purpose uses.<sup>39</sup> While some local stakeholders suggest additional local varieties exist, these claims could not be verified through publicly available data. Meanwhile, most hemp seed used by South African farmers is imported from Europe, with growing contributions from China, Australia, and North America.

## **B. Protection (Breeder Rights)**

After investing significant time and resources into developing pure, distinct, uniform, and stable plant genetics, breeders typically seek to protect their Intellectual Property (IP) through plant breeders' rights (PBR). These rights safeguard breeders' innovations by preventing unauthorised propagation or commercialisation of their new varieties.

In South Africa, protection of new plant varieties falls under the Plant Breeder Rights Act (15 of 1976)<sup>40</sup>, which establishes a formal approval process for registering and enforcing these rights. Applications must be submitted to the Registrar of the PBR by South African individuals, entities, or institutions; foreign applicants must apply through a local agent.

The application process requires detailed information demonstrating that the new variety meets key criteria: it must be new (not sold or disposed of for more than one year in South Africa, or four years elsewhere), distinct from existing varieties of the same species, uniform in its characteristics, and stable across repeated propagation. Once submitted, the Registrar conducts a series of DUS (Distinctness, Uniformity, Stability) tests over 2 to 3 years. During this period, commercial marketing or sale of the variety is prohibited. Often, though, this evaluation runs concurrently with the national variety listing process.

Upon approval, breeders receive rights for 20 to 25 years, allowing them to commercialise the variety and potentially license these rights to others, creating opportunities to earn royalties.

Currently, South Africa has only three hemp varieties listed under plant breeders' rights (although it is unclear if rights have been conferred): ARCAN-001 and ARCAN-003, both bred and owned by the Agricultural Research Council (ARC), and NWG 2730, bred by New West Genetics LLC in Colorado, USA, and marketed locally by StarkAyers, a South African seed company. The licensing status of the ARC varieties remains unclear at the time of writing.

## **C. Seed Registration (Plant "Variety Listing")**

Not all breeders pursue commercialisation of their IP, but for those who do, compliance with national requirements is essential. New varieties must be included on the approved National List before they can be marketed. This varietal listing serves to protect breeders' investments and facilitates commercialisation, acting as an optional but complementary step alongside plant breeders' rights.

---

<sup>39</sup> <https://pmg.org.za/committee-question/29396/>

<sup>40</sup> Republic of South Africa. (1976). *Plant Breeder's Rights Act* (Act No. 15 of 1976). Government Gazette.

The regulation of seed registration in South Africa is governed by the Plant Improvement Act (PIA), Act No. 53 of 1976. Under this act, applications for variety listing are submitted either to the Registrar for Table 2 crops or to SANSOR (South African National Seed Organisation) for Table 8 crops.<sup>41</sup> Regulation 24, specifically Government Notice Nr R.1064, states that seed from Table 8 varieties can only be marketed if it is certified under the South African Seed Certification Scheme, with SANSOR designated by the Minister of Agriculture as the certifying authority. Additionally, the Plant Improvement Act allows for the importation of unregistered varieties when local seed stocks are insufficient, subject to certain conditions and approvals from the Registrar.

The registration process begins with the breeder's decision to commercialise their variety. They submit propagating material, technical information, and at a minimal fee to the relevant authority. Accredited personnel then assess the variety based on DUS criteria - Distinctness, Uniformity, and Stability. Often, breeders submit applications for both national variety listing and plant breeders' rights simultaneously to streamline the process. Once approved, the seed variety is placed on the National List, and ongoing maintenance of basic and pre-basic seed stocks is required to support certification.

The evaluation and listing typically take one to two growing seasons, not including the seed multiplication period needed for certification. While holding plant breeders' rights can protect intellectual property, it is not mandatory for variety listing. Efforts toward regional harmonisation of seed regulations (such as within SADC or the EU) may reduce duplication, though hemp is currently excluded from these lists.

In South Africa, only five hemp varieties are currently known (at the time of writing) to have been submitted for listing: ARCAN-001 and ARCAN-003 (fibre varieties bred by the Agricultural Research Council), NWG-2730 (a dual-purpose variety bred by New West Genetics and marketed by Stark Ayers), and two dual-purpose/fibre varieties, SABL8 and SAPA1, marketed by Ignited Unlimited.

#### **D. Seed Certification (Quality Assurance)**

Seed certification serves as a legally recognised system to ensure and control the quality of seed production and multiplication. By maintaining varietal purity and identity, certification guarantees that farmers receive seed that consistently meets the standards set by breeders. This assurance reduces downstream risks and safeguards both farmer confidence and market integrity by confirming that the seed marketed is true to type and reflects the intended characteristics.

In South Africa, seed certification is governed under the Plant Improvement Act (PIA), which includes provisions for certification schemes. SANSOR<sup>42</sup> acts as the Designated Authority responsible for

---

<sup>41</sup> In the context of South Africa's Plant Improvement Act and seed regulation, "Table 2" and "Table 8" refer to specific categories of crops that determine how their seed registration and certification are managed.

Table 2 crops are generally agricultural or field crops that fall under the direct oversight of the Registrar of the PIA for their variety listing and are often subject to a particular set of regulatory requirements related to their registration and marketing.

Table 8 crops, on the other hand, include seed crops that require additional quality control measures. For these crops, seed can only be marketed if it has been certified under the South African Seed Certification Scheme, which is administered by SANSOR to ensure that seed meets strict standards for purity, germination, and identity before it can be sold commercially.

The distinction essentially means that Table 8 crops have a mandatory seed certification requirement, while Table 2 crops are listed and regulated primarily through the Registrar's office without that compulsory certification step.

<sup>42</sup> <https://www.sansor.org/seed-certification>

managing the Seed Certification Scheme at both national and international levels, including for industrial hemp. While certification is legally sanctioned, it is generally voluntary except for certain regulated crops.

The certification process begins when breeders submit an application to SANSOR, which screens the parent seed for origin and certifiability. Accepted crops are then grown under strict conditions and inspected by authorised personnel to ensure compliance with scheme requirements. This includes monitoring isolation distances, rogueing practices<sup>43</sup>, land and planting protocols, and managing volunteer plants or previous cropping histories that could affect purity.

Throughout cultivation, inspections are systematically conducted and documented by SANSOR in collaboration with the Department of Agriculture. After harvest, seeds are cleaned and processed in registered facilities. SANSOR oversees sampling to verify packaging, labelling, and seed list compliance. Accredited laboratories perform germination and purity testing, while the Department's Variety Control Division plants parallel samples to confirm consistency with the reference variety.

Upon meeting all criteria, SANSOR issues a certificate accompanied by a distinctive blue seal and label identifying the lot as certified seed.

Certification is a comprehensive, multi-season process that spans several propagation cycles, typically taking three to four growing seasons to complete. While certification itself does not confer intellectual property rights, it formally recognises that seed is authentic, pure, and meets statutory quality standards. This protects farmers by guaranteeing varietal identity and reduces production risks, while also safeguarding breeders' commercial interests by restricting the legal marketing of uncertified seed where certification is required.

In South Africa, a hemp seed certification scheme has been developed by SANSOR and received internal approval, but it still awaits official gazetting by the Minister of Agriculture. Consequently, no locally certified hemp seed varieties are currently available, and farmers continue to depend on imported or uncertified seed in the meantime.

## **E. Seed Production (“Multiplication”)**

Seed multiplication aims to produce sufficient volumes of multiple generations of seed across to supply farmers, while maintaining the purity and identity of the variety. Starting from limited quantities of breeder seed, the process progressively scales up through stages of pre-basic, foundation/basic, and finally certified seed. This structured multiplication ensures quality control alongside meeting market demand, forming the vital link between seed development and commercial distribution.<sup>44</sup>

---

<sup>43</sup> Rogueing is the process of identifying and removing unwanted or off-type plants from a seed crop to prevent contamination. These “rogues” can differ genetically or be diseased, threatening seed purity. Inspectors regularly remove such plants to maintain the seed's genetic identity and quality. Along with isolation and managing volunteer plants, rogueing protects the seed lot's integrity, ensuring farmers get reliable, uniform seed.

<sup>44</sup> Mussa, M., & Wondimu, M. (2017). *Socio-economic and seed quality aspects of decentralized seed multiplication schemes: A case study in Ethiopia* (CGIAR Research Program on Dryland Systems). CGIAR.

<https://cgspace.cgiar.org/server/api/core/bitstreams/ed28ea4b-a01d-441c-8bab-3ff8eb4256c2/content>

In South Africa, seed production is regulated under the Plant Improvement Act (PIA)<sup>45</sup>, which governs certification schemes and the quality and sale of seed. SANSOR serves as the Designated Authority for seed certification nationally and internationally, including industrial hemp. While certification is legally sanctioned, it remains generally voluntary except for certain crops. For hemp, certification requirements are still evolving, but global best practices and SANSOR's hemp scheme indicate certified seed will likely become standard.

The multiplication process begins with breeder seed, the purest genetic stock of a variety. This seed is used to produce pre-basic seed, which in turn generates foundation or basic seed. These stages produce high-quality stocks that culminate in certified seed,<sup>46</sup> the highest quality grade sold to farmers. Each phase must uphold varietal identity and quality standards to prevent degeneration. Throughout this multi-season journey, careful crop management is critical (e.g. isolation distances, rogueing, regular monitoring).

Seed companies or breeders typically contract specialised seed producers to undertake multiplication. These producers operate under Material Transfer Agreements (MTAs) that regulate usage rights, marketing restrictions, and genetic material retention. Due to the technical complexity and stringent quality requirements, seed producers often command higher returns than conventional farmers.

Multiplication is inherently time-consuming, often spanning 3 to 5 years to build adequate seed stocks for sustainable commercial distribution. The process duration depends on the "multiplication ratio" - the number of seeds produced per seed planted - which for hemp ranges from 1:10 to 1:30 depending on the variety. This means one hectare of breeder or foundation seed is needed for every 10 to 30 hectares intended for cultivation.

While multiplication allows scaling seed volumes, intellectual property rights remain with the breeder. MTAs protect breeders' interests by specifying conditions on use and marketing. Certification adds a layer of quality assurance but does not alter IP ownership.

South Africa boasts robust commercial seed production capabilities, with nearly half of SANSOR members involved in seed multiplication. In the hemp sector, Starke Ayres produces New West Genetics varieties, while the Agricultural Research Council (ARC) multiplies ARCAN varieties. Although NWG seed production follows certification guidelines even before formal gazetting, compliance for ARCAN seed is less clear. Overall, South Africa is well positioned to scale hemp seed production as regulatory frameworks mature.

## **F. Seed Marketing and Distribution**

After seed production, the next critical step is preparing seeds for market through a series of post-harvest processes including threshing, drying, cleaning, pre-processing, testing, and packaging. These steps ensure seeds meet both legal and quality standards necessary for lawful sale. Breeders,

---

<sup>45</sup> The Plant Improvement Act, 1976 (Act No. 53 of 1976) regulates the production and sale of plant propagating material, including multiplication. Section 1 defines key terms related to multiplication, and Section 6 requires registration of premises involved in producing or selling such material. This ensures control over the quality and legality of multiplication activities.

<sup>46</sup> SANSOR administers seed certification schemes covering all seed classes from breeder seed through to certified seed, ensuring quality control throughout the multiplication cycle.

as intellectual property owners, may opt to market their varieties directly or license marketing rights to other companies, allowing commercialisation under either denominated or generic names.

Marketing activities are regulated under the Plant Improvement Act (PIA), which governs all seed preparation processes. Businesses engaged in these activities must be registered under the PIA and comply with strict packaging, labelling, and denomination standards.<sup>47</sup> While the PIA provides exemptions for marketing “unregistered varieties” via special permits, import permits are typically restricted to small quantities (up to 2 hectares per application), whereas cultivation permits can allow up to 50 hectares.

In South Africa, seed distribution largely occurs through licensed distributors or networks linked to large agribusinesses, as there is no dedicated agro-dealer segment. Although a few registered seed marketers operate outside these large entities, the limited availability of locally bred and registered hemp varieties forces most farmers and marketers to rely heavily on imports from the European Union, North America, China, and Australia. Bulk import permits - such as the one issued to CannAgri Global - play a vital role in reducing import costs by consolidating expenses related to phytosanitary testing, logistics, and customs clearance.

Some commercial farmers choose to source seed directly from importers, taking on compliance obligations themselves. Seed prices vary widely based on genetics, end-use, certification status, and seed type, with certified hybrid seeds commanding premiums due to their superior quality, uniformity, and yield advantages.

*“The market is not yet open, so we often depend on off takers who bring their own seeds. That limits our influence on cultivar choice.”*  
*(Int 18, South African Farmer)*

The entire marketing preparation process, including post-harvest handling, regulatory compliance, packaging, and import logistics, can take several months following seed multiplication. Marketing rights remain with breeders, who may retain exclusive rights or license them under specific agreements that govern storage, sale, and usage conditions.

Currently, South Africa has several registered seed marketers and distributors - mostly SANSOR members.

---

### 2.2.2. ON-FARM - CULTIVATION

---

This section builds on seed production to explore the landscape of hemp cultivation in South Africa, where carefully selected genetics are turned into products that meet a wide range of market demands. It begins by examining demand dynamics, then moves through the regulatory framework, permit processes, and the geographic factors influencing hemp growing. Additionally, it provides an overview of cultivation practices, productivity levels, the unique value of hemp straw, and pricing factors shaping the market.

This crucial segment of the value chain focuses on on-farm production activities. Legal hemp farming in South Africa is still in its early stages, with permits first issued in mid-2022 and the first full growing season taking place in 2023/2024. The current hypothesis which is based on extensive desktop research and qualitative and quantitative data analyses, is that demand will rise strongly across five

---

<sup>47</sup> Throughout the PIA reference is made to packaging, labelling, and domination standards to be adhered to.

priority pathways: textiles; building and construction; food and beverages; wellness, pharma and cosmetics; and plastics and bio composites. This conclusion draws on both global and national market data, industry reports, stakeholder interviews, and consumer trends, highlighting these sectors as having the greatest growth potential.

Outline for this Cultivation sub-section is comprised of the following discussions:

- I. Demand overview
- II. Regulatory environment
- III. Overview of permits
- IV. Where hemp is grown
- V. How hemp is grown
- VI. How productive hemp is
- VII. Criticality of straw
- VIII. Pricing considerations

## **I. Demand Overview**

This section begins by examining the demand landscape for hemp cultivation in South Africa, where the industry is still in its infancy, having only been legally permitted from late 2022. The emerging market potential centres around five priority pathways: textiles; building and construction; food and beverages; wellness, pharma and cosmetics; and plastics and bio composites. These sectors represent the key hypotheses for where demand will develop, driving the selection of hemp genetics and shaping cultivation practices to produce farm-gate products tailored to specific end-uses. Understanding this demand overview is essential because it sets the stage for how cultivation transforms agricultural inputs into outputs that align with market needs. As the industry evolves, identifying and responding to these demand drivers will be critical for building robust, locally adapted supply chains. This foundation informs the following sections on regulatory frameworks, growing environments, the critical role of hemp straw, and pricing dynamics.

What farmers grow depends entirely on demand for the processed plant parts that are the primary raw material feedstock for downstream manufacturing. Consequently, in most cases, buyers of farm-gate products will determine not only the genetics but also the detailed specifications (quality, volumes, and prices) that govern contractual relationships between farmers (suppliers) and processors (buyers).

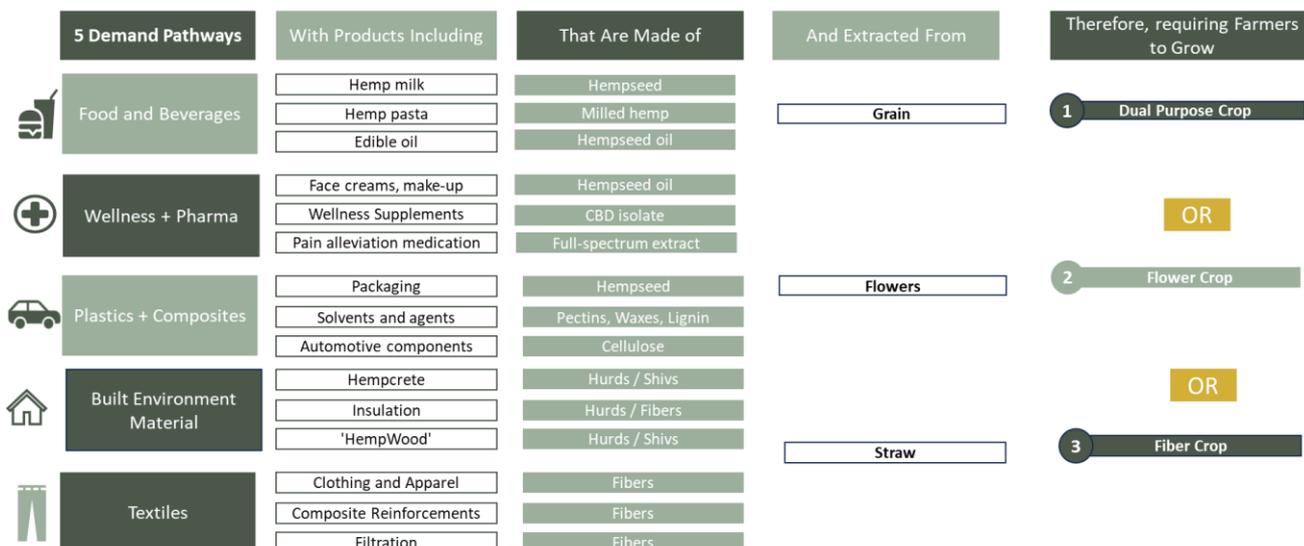


Figure 11: Cultivation: Demand for Farm-Gate Products<sup>48</sup>

## II. How Hemp Cultivation is Regulated

The hemp regulatory environment in South Africa is relatively complex. There are several ways to understand this but it's easiest to explain these based on area of the value chain. The Upstream sub-section provides a detailed view of the regulation of seeds and other agricultural inputs. There are no known hemp-specific legislation or regulations at Mid-Stream and product specific requirements are governed by those sub-sectors. However, cultivation remains the primary locus of legislation and regulatory reform work since this is the primary part of the value chain most recently liberalised. As such, a specific is included in an effort to simplify a complex universe.

At the highest level, hemp is enabled and governed primarily by four acts. The first two - the Drugs and Medicines Acts - regulate scheduled or controlled substances and narcotics and in South Africa are read concurrently rather than in substitution of one another. The Medicines Act governs the production and trade of all cannabinoid-containing products, all of which remain “scheduled substances” although, critically, THC is exempted where hemp is grown for non-medicinal purposes and under a permit issued by the Department of Agriculture. However, the Drugs Act, which among other things criminalises the unlawful trade in scheduled substances and the financing thereof, is yet to be amended to remove “dagga, the whole part and any part thereof” from its schedules. This amendment, however, depends on the approval of regulations of the third relevant act, the Cannabis for Private Purposes Act, which was assented to by the President in mid-2024. While the CfPPA does not regulate hemp, it nevertheless provides a distinction between dagga and hemp based on a plant part - the “fruiting and flowering tops”, a definition with origins in the United Nations Single Convention - and sets the stage for the Drugs Act amendments. It then delegates governing authority to other relevant Acts. Finally, the principal governing legislation for hemp cultivation is the Plant Improvement

<sup>48</sup> Image source: Zagea Solutions, 2025.

Act (described in the Upstream sub-section), which formally recognises hemp as an agricultural commodity.

Through this recognition, the PIA makes provisions for National Department of Agriculture's issuance of the legal right to cultivate for research or commercial purposes. Under this Act, the National Department is able to establish any other defining features of hemp including, principally, its THC content. Though yet to be formalised at the time of writing, it is understood that this maximum level will be set at 2% dry weight, among the highest allowances anywhere in the globe. Prospective permit holders wishing to cultivate hemp may access application forms accessible on the Department's website and must pay a small fee (less than R1,000 including VAT) as well as comply with various requirements (e.g., police clearance, inspections etc) before receiving a permit.<sup>49</sup> The permit allows a farmer to grow on up to 50 hectares and for a period of up to 3 years, on a renewable basis. Pre-harvest, the Department is responsible for administering THC tests on harvested biomass (alongside general inspections) and permit holders are required to report annually on their activities and outputs.

*"Right now, it is confusing and inconsistent... I support permits - hemp must be regulated to prevent abuse - but permits should allow farmers to farm freely and competitively." (Int 18, South African Farmer Association).*

The primary complexity with regards to the regulatory environment rests on how CBD and other non-intoxicating cannabinoids are regulated. Despite the World Health Organisation's 2018 recommendations<sup>50</sup> to de-schedule CBD, it remains legally controlled under Schedules 0 and 4 of the Medicines Act<sup>51</sup>. Today, most CBD available in most global markets is derived from hemp "fruiting and flowering tops", the very part of the plant that the CfPPA and eventually Drugs Act recognise as "dagga". It is therefore unclear whether the cultivation of the starting material from which CBD is derived is or ought to be scheduled and regulated by the Medicines rather than the Plant Improvement Acts. This applies equally to pharmaceutical applications, whose Good Manufacturing Practice (GMP) standards dovetail from where Good Agricultural and Collections Practice (GAP or GACP), which applying to cultivation. These requirements and regulations create challenges for operators and policy makers alike, but these challenges are not unique to South Africa. International examples suggest variations from CBD and cannabinoid restrictions in the United States to CBD as a replacement for tobacco in Switzerland.<sup>52</sup>

*"Farmers face multiple overlapping standards - GAP, HACCP, GACP, SABS, European standards - but there is no clear guidance upfront." (Int 18, South African Farmer Association).*

In addition to the many Acts, regulators, and how CBD is governed, there are regulations for a variety of downstream hemp uses that would typically inform cultivation-specific legislation and which have

---

<sup>49</sup> These requirements were already covered in detail and are not discussed comprehensively.

<sup>50</sup> Regarding the World Health Organization's 2018 recommendations: "The WHO Expert Committee on Drug Dependence recommended that preparations considered to be pure cannabidiol (CBD) should not be placed under international drug control as the substance does not exhibit effects indicative of abuse or dependence potential." <https://cdn.who.int/media/docs/default-source/controlled-substances/whocbdreportmay2018-2.pdf>

<sup>51</sup> On the legal status of CBD and cannabinoids in South Africa under the Medicines Act: "Cannabidiol (CBD) is listed in Schedule 4, except in complementary medicines containing no more than 600 mg cannabidiol per sales pack, providing a maximum daily dose of 20 mg CBD." <https://www.sahpra.org.za/thc-and-cbd-information-page/>

<sup>52</sup> Feedback from Focused Group Discussions.

not yet been updated to make provisions and allowances for hemp. The slow pace of regulatory reform and fragmented institutional arrangements in South Africa for governing hemp has meant that there has been insufficient focus on thinking about a regulatory eco-system rather than individual

*“You can’t just plant hemp and expect an industry to appear. You need clear regulation, incentives, and offtake frameworks to make it bankable.” (Int 8, South African Energy Company)*

Acts. This perhaps reflects the lack of national strategy or policy that would lend a common and consistent approach that sends clear market signals.

From extensive engagements with local and global stakeholders, it is evident that the absence of a clear, segmented industrial policy creates regulatory ambiguity that slows the industrialisation and commercialisation of hemp. Mixed signals from governments globally

and contradictory regulations generate immense uncertainty for farmers, manufacturers, and investors, despite the sector’s significant potential and growing demand. Stakeholders continually emphasised that regulatory clarity and especially the distinction between industrial hemp from intoxicating cannabis in legislation as well as clarifying CBD’s classification and defining downstream uses is essential to unlock investment and scale production.

### III. Snapshot of Permits Issued<sup>53</sup>

As discussed in the previous section, the only “right to operate” relates to either licences issued by SAHPRA or cultivation permits issued by the Department of Agriculture. While hemp research permits have been issued for many years, “commercial hemp permits”, the subject of this subsection, were only issued beginning in late 2022. There little publicly available information about permits issued (nor how or if permit holders are exercising those rights, since it appears reporting requirements have not been enforced), limiting opportunities to identify focus areas that may meaningfully support farmers. Nevertheless, raw data from the national Department provides a summary of hemp permits issued between from inception up to September 2024, offering an existing base from which to build.

In summary, a total of 1,725 permits have been issued to South African permit holders<sup>54</sup> since 2022, representing an almost four-fold increase from the first cohort. For a permitted land cultivation size perspective, almost 29,000 ha are under the legal right to cultivate, with an average of 16.8 ha per permitted site. Although KZN accounts for the largest provincial share in both hectares permitted (30.9%) and numbers of permits (35.5%), its permitted sites are on average smaller than the national average (14.6ha). Similarly, Gauteng accounts for the 2<sup>nd</sup> largest share in numbers of hemp permits (16.6%), but given the lower average size of permitted site (10ha), its share in total hectares is lower. This is perhaps unsurprising in Gauteng given that it is the smallest province in South Africa, but small scale may have implications on viability (discussed in more detail in Chapter 5). By comparison, the Eastern Cape, together with KZN, is also considered a hemp hub and accounts for 14% of total hemp permits but, given large permitted sizes, accounts for nearly 1 in every 5 hectares permitted (18%).

---

<sup>53</sup> National Department of Agriculture, South Africa. (n.d.). *Guidelines for the production of industrial hemp in South Africa* (HP-GD-001). <https://www.nda.gov.za>

<sup>54</sup> So called given that it is unclear if these are farmers or individuals or entities simply with tenure over land since sites, rather than individuals, are permitted.

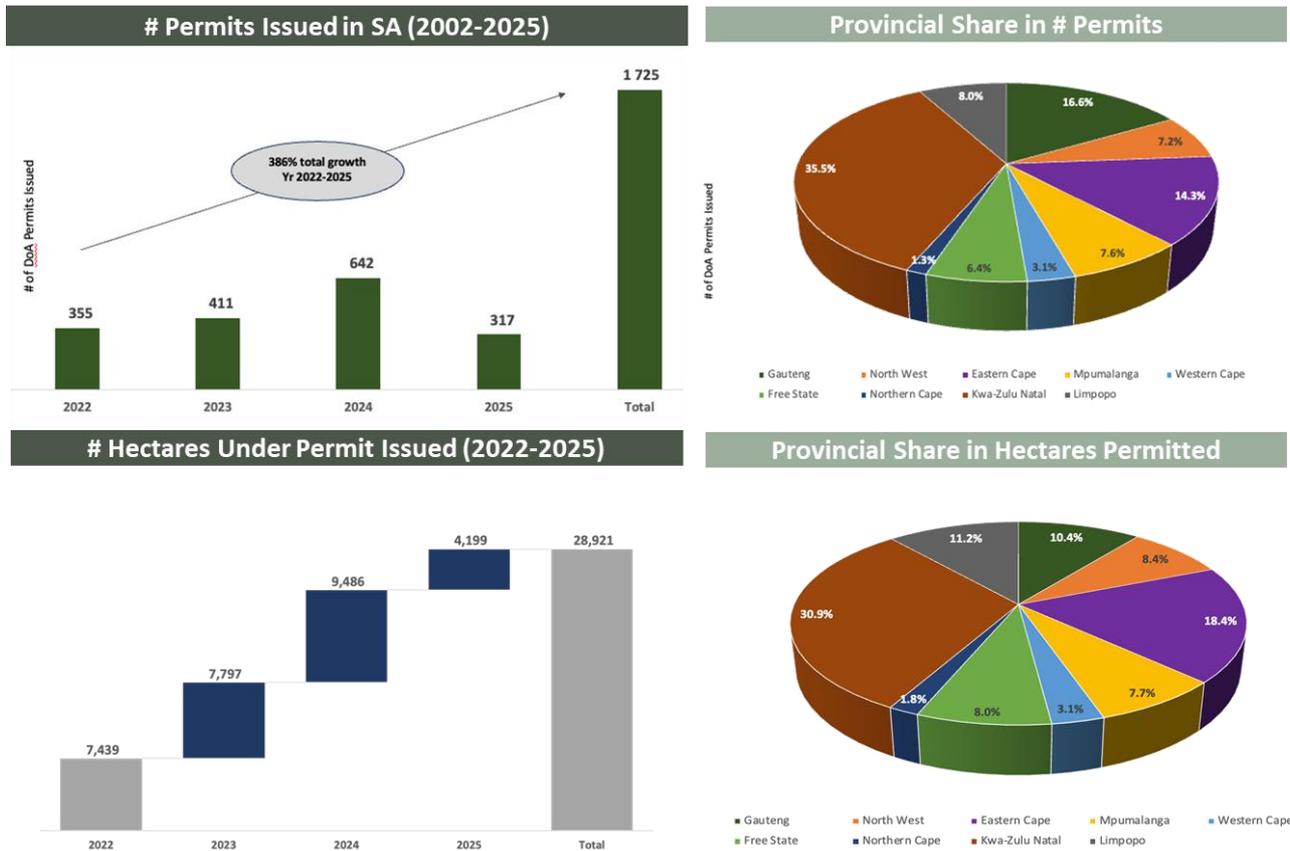


Figure 12: Snapshot of South African Hemp Permits (2022 - 2025)<sup>55</sup>

At present, there is no data available to assess the demand dynamics driving activities by permit holders nor whether they are growing at all. While this remains a limitation of this study, understanding this snapshot allows us to understand the quantum and geographic spread of supply, which itself has important implications on both agricultural adaptation and spatial planning explored in the next sub-section.

#### IV. Where Hemp is Grown

The location of hemp cultivation carries significant implications not only for spatial planning but also for the adaptation of hemp genetics to specific environments and for land-use management to prevent yield-reducing cross-contamination.

##### A. Agricultural Considerations

Hemp is a highly adaptable crop, yet achieving peak productivity depends on aligning genetics with local environmental conditions such as soil type, climate, and photoperiod. Growth and performance are strongly influenced by day length, which varies with latitude. Most legally approved hemp genetics originate from the global north. For example, French varieties perform best above approximately 50°N latitude, where summer day lengths exceed 16 hours. In contrast, South African

<sup>55</sup> Zageta and the DPRU/UCT analysis based on data provided by the National Department of Agriculture and both organisations cannot be held responsible for the veracity of this data.

provinces like the Western Cape, Eastern Cape, and KwaZulu-Natal experience maximum day lengths of about 14.4 hours, which can limit the performance of these northern-bred varieties.<sup>56</sup>

Local adaptation of genetics may take several years, and initial feedback from farmer interviews, supported by ARC trials, has already highlighted challenges related to productivity, cannabinoid content, and yield.

Land use and zoning considerations are critical due to hemp's dioecious nature, meaning it has separate male and female plants. Most varieties are open-pollinated (OPVs), and female flowers are economically important for producing inflorescences, while male plants typically need to be removed unless feminised seeds are used. Grain and fibre crops are less sensitive to male plants, with fibre often harvested before flowering. South Africa's long history of cannabis cultivation and the presence of local landrace genetics increase the risk of cross-pollination, which can diminish oil yield in grain crops and cannabinoid content in CBD flowers.

To manage these risks, zoning strategies such as dedicated cultivation zones or minimum isolation distances are employed to prevent cross-contamination. Zoning can be implemented centrally through national permitting or locally via municipal land-use enforcement. Internationally, countries like China and France concentrate hemp production within designated zones to protect genetic integrity.

For farmers, matching hemp genetics to local climate and day length is essential to achieve desired yields and quality. Selecting cultivation sites strategically reduces the risk of cross-pollination with illicit cannabis or other hemp varieties. Compliance with national permits and local zoning regulations is necessary to avoid conflicts and promote sustainable cultivation practices.

## **B. Spatial Planning Considerations**

Earlier the discussion covered the importance of “place” for hemp cultivation in terms of genetic adaptation and zoning requirements. Place also plays a critical role in spatial planning, as the concentration of activities within a region influences the efficiency of backward and forward linkages, as well as adjacencies and complementarities that can enhance productivity, economic impact, and the hemp business case. This section examines high-level examples from two leading hemp producers - France and China.

France, the world's second-largest hemp producer, cultivated approximately 23,000 hectares in 2024. Although hemp is grown in several regions, production is highly concentrated in just two major areas. The Normandy region in the northeast, known for its traditional flax-linen industry, and the Troyes area northeast of Paris, which alone accounts for 70% of national output. This concentration is supported by a vertically integrated cooperative model anchored within a regional industrial cluster, fostering strong linkages across the value chain.<sup>57</sup>

China, the world's largest hemp producer, grows nearly double the area of France with around 50,000 hectares, together accounting for about 70% of global hemp output. Hemp cultivation in China is extremely concentrated in two provinces: Yunnan in the southwest and Heilongjiang in the northeast,

---

<sup>56</sup> Agricultural Research Council. (n.d.). [Hemp research and development](https://www.arc.agric.za/arc-iic/Pages/Hemp.aspx). <https://www.arc.agric.za/arc-iic/Pages/Hemp.aspx>

<sup>57</sup> <https://www.pole-europeen-chanvre.eu/en/the-hemp-sector-in-grand-est-outlines-its-outlets-for-economic-development-with-a-european-and-global-focus/>

the country's "grain barn." Heilongjiang alone contributes 80% of China's hemp production, with cultivation anchored by large-scale processors and vertically integrated companies that aggregate supply and coordinate value chain activities.<sup>58</sup>



*Figure 13: Maps of Hemp Production in France (left) and China (right)<sup>59</sup>*

Key insights from these examples highlight that hemp cultivation is globally concentrated, with just two countries accounting for nearly half of the world's output. Within countries, hemp production follows similar regional concentration and planning patterns, supported by a combination of soft infrastructure - like cooperative networks and industry linkages - and hard infrastructure such as processing facilities and logistics. A regional/localised focus enables targeted support, strengthening linkages, adjacencies, and complementarities that boost competitiveness and economic resilience.

### **C. Spatial Distribution of South African Hemp Farms under Permit**

Hemp cultivation clusters are beginning to emerge in Gauteng, KwaZulu-Natal (KZN), and the Eastern Cape (EC). These clusters are driven by local initiatives, farmer networks, and growing participation from private sector players focused on developing hemp value chains. While these areas show promising activity, detailed land-use maps are not yet available to confirm whether these clusters occupy the most suitable agro-ecological zones for optimal hemp growth. Aligning these clusters with downstream value chain opportunities will be essential, considering factors such as demand pathways and existing industrial capabilities. This Value Chain section, together with the broader hemp industrialisation study focused on opportunity set prioritisation, will provide the evidence base to identify where vertically integrated clusters could be most effectively located. In turn, this may require adjustments to permitting processes and related production incentives to support the development and sustainability of these regional clusters going forward.

---

<sup>58</sup> <https://hempfoundation.net/top-5-countries-leading-the-way-in-industrial-hemp-production/>

<sup>59</sup> Image source: Zagea Solutions, 2025.



## South Africa

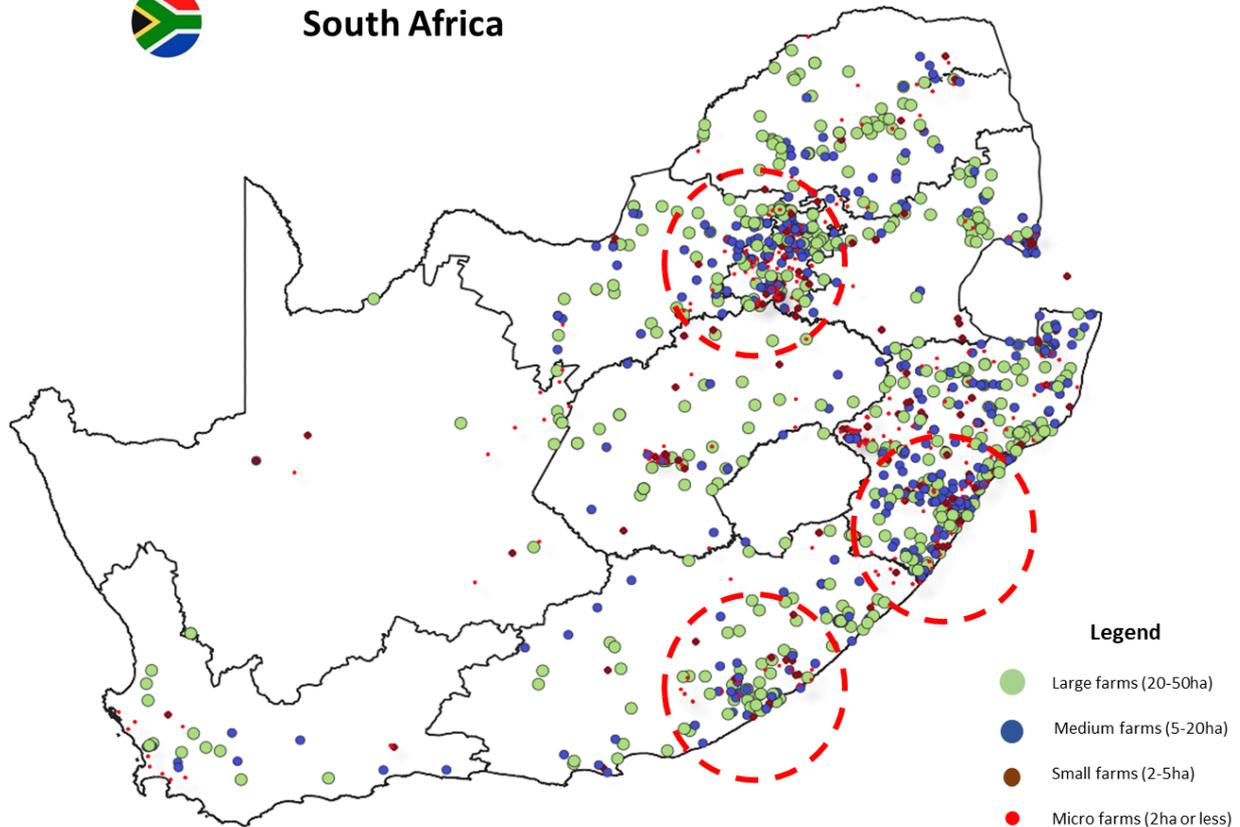


Figure 14: Spatial Distribution of Hemp Farms in South Africa (2025)<sup>60</sup>

## V. How Hemp Is Grown

Growing hemp varies widely depending on the desired end product (demand pathway), which determines the type of primary inputs and therefore also the type of hemp. As discussed in Chapter 1, hemp can be grown for different purposes - whether it is the flower (inflorescences), seed for grain, or the stalk biomass (straw). Each purpose demands a different approach to planting, cultivation, and harvest to optimise yield and quality. An overview of hemp varieties cultivated for each purpose is provided below, distinguishing between what is prized, how it is planted, and how it grows. These distinctions lend key characteristics to parts of the hemp plant that determine their feasibility of and requirements for processing and manufacturing. Additionally, these differences also become important when Chapter 5 considers the economic viability of cultivating these different parts.

### A. Hemp for Flower (Inflorescences)

Typically, hemp flower is propagated from clones to produce seedlings. These seedlings are planted at a low seed sowing density (less than 30 kg per hectare) with wide row spacing to encourage maximum branching. This branching supports the growth of abundant female flowers, which are the primary target since they contain the prized cannabinoids. Flower hemp can be grown under irrigation

---

<sup>60</sup> Image Source: Zageta Solutions, 2025, using GIS data provided by National Department of Agriculture (September 2025).

or dryland conditions, but isolation distance is critical to prevent cross-pollination, which would reduce flower quality.

During growth, plants are carefully managed for pests and diseases, and male plants are removed to ensure maximum female flower production. Fertigation provides nutrients essential for high yields. The plants typically vegetate for about 110 days post-germination, then flower over roughly four months before harvest. Mature plants are stocky with thick stalks up to 20 mm in diameter and multiple branches heavy with female flower clusters. The key value lies in the cannabinoids concentrated in the female flower bracts, with some residual amounts in the leaves.<sup>61</sup>

Harvesting is done using combine or specialised harvesters that remove flowers from the branches, typically yielding between 300 and 800 kg per hectare. The harvested flowers then undergo drying, curing, and trimming processes similar to tobacco before packaging. The leftover stalk biomass, which makes up 70-80% of the plant, is generally considered waste in this context.

For hemp flower, drying is critical - bringing moisture down to 8-10% immediately after harvest to prevent spoilage and preserve cannabinoids. After drying, curing takes place, similar to tobacco curing, which matures the flower and intensifies its characteristics. Curing can also be done on wet flower but is vital for quality.

## **B. Dual-Purpose (Grain or Seed)**

Seed hemp, whether grown for sowing or grain, starts from breeder or propagating seed planted at medium densities (45-75 kg per hectare) with moderate row spacing (7-15 cm) to allow some branching for seed development. These crops can be irrigated or dryland but require careful siting to avoid cross-pollination.

After planting, the crop is fertigated to maximise nutrient uptake. Thanks to the denser planting, weed pressure is minimal, and pest or disease management is often unnecessary. Plants grow for about 90 days during increasing daylength (spring to summer solstice), then begin flowering as daylength shortens. After flowering, seed pods develop and mature over 6 to 8 weeks before harvest, indicated by pods naturally opening.<sup>62</sup>

Seed hemp plants are typically tall (up to 2 meters) but thinner (less than 20 mm diameter) than flower hemp, with enough branching to support seed production. Unlike flower hemp, the goal here is to maximise seed volume rather than minimise seed in the flowers.

Harvesting uses combine harvesters similar to those for other grain crops (sunflower, maize, soy). Seed yields range from 1 to 3 metric tons per hectare. After harvesting, seeds are threshed, cleaned, and dried to about 8% moisture for long-term storage or further processing. The remaining straw biomass (3 to 8 metric tons per hectare) is mowed and left to dry in the field for about one week before baling and storage. This straw, yellowish in colour, is marketable.

---

<sup>61</sup> Spano, M., Di Matteo, G., Ingallina, C., Sobolev, A. P., Giusti, A. M., Vinci, G., Cammarone, S., Tortora, C., Lamelza, L., Prencipe, S. A., Gobbi, L., Botta, B., Marini, F., Campiglia, E., & Mannina, L. (2022). Industrial Hemp (*Cannabis sativa* L.) Inflorescences as Novel Food: The Effect of Different Agronomical Practices on Chemical Profile. *Foods (Basel, Switzerland)*, 11(22), 3658. <https://doi.org/10.3390/foods11223658>

<sup>62</sup> N.C.A&T State University. (2022). All About Hemp. A Manual for farmers and other Agricultural Professionals. <https://ncat.edu/caes/cooperative-extension/files/all-about-hemp.pdf>

Hemp grain needs rapid drying to 8-12% moisture within as little as four to six hours post-harvest. This prevents the seeds from going rancid and allows for long-term storage and eventual marketing. Grain cultivation was mentioned by stakeholders as having a lower barrier to entry, due to the preexisting infrastructure related to other grains used for oils.

*“Processing capabilities are already there... no big investment needed to process hemp grain.”*

*(Int 1, Economic Consultant)*

### C. Hemp for Fibre (Straw)

Straw or fibre hemp is grown from breeder seed at much higher densities - at least 85 kg per hectare - with narrow row spacing (5 to 7 cm). This encourages the plants to grow tall and slender rather than wide and branched, suppressing weeds naturally. Straw hemp is almost exclusively grown under dryland conditions.

The plants mature quickly, often in about 100 days, with minimal inputs beyond soil fertility and moisture. They are harvested before flowering to avoid lignification - the hardening of stalk fibres that reduces quality. Mature straw hemp plants are very tall (over 2.5 meters) but thin (under 15 mm diameter), quite different in appearance from flower hemp.

What matters most here is total straw biomass and fibre yield, which can range from 20-35%. Both genetics and cultivation practices, as well as post-harvest handling like retting, influence fibre quality.<sup>63</sup>

From here, the next critical step after harvest is processing and preparing the product for marketing and sales, ensuring it reaches the right buyers in optimal condition.

Harvesting uses specialised mowers to cut straw about 40 cm from the base, yielding 10 to 20 metric tons per hectare. The cut straw is left to dry and undergo a retting process - controlled rotting over 3 to 8 weeks that breaks down pectins binding fibres to the woody core. The straw turns greyish as retting progresses, after which it is baled and stored.

**Hemp straw** requires drying to 13-18% moisture to avoid swelling from its high water absorption. Post drying, the straw undergoes retting - a delicate process done either chemically, in water, or most commonly through field or dew retting. Retting breaks down pectins that hold fibres and hurds together, making fibre separation easier and improving fibre quality. This process is time-consuming and relies heavily on farmer experience and sensory testing, as its scientific basis remains somewhat elusive.

## VI. How Productive Hemp Is

Hemp productivity, measured as yield (in kg or MT) per area planted (typically per ha), depends on several important key factors that together inform output volumes.

- A. First and foremost is genetics.** The genetic makeup of a hemp plant drives its core characteristics - whether it's optimised for flower, grain, or straw production. Breeders focus on developing varieties that maximise yield for a specific plant part. Hybrid varieties, in

---

<sup>63</sup> Amaducci, S., Zatta, A., Pelatti, F., & Venturi, G. (2008). Influence of agronomic factors on yield and quality of hemp (*Cannabis sativa* L.) fibre and implication for an innovative production system. *Industrial Crops and Products*, 27(2), 162–171. <https://doi.org/10.1016/j.indcrop.2007.02.002>

particular, tend to outperform open-pollinated varieties (OPVs), delivering significantly higher yields thanks to their carefully combined traits.<sup>64</sup>

- B. Next comes adaptation.** Even the best genetics need to thrive in their environment. Hemp is sensitive to its surroundings, with latitude being especially important since it affects how the plant responds to light and climate. Successful cultivation hinges on selecting genetics suited to the local agri-climatic conditions, ensuring the plant can perform at its best.
- C. Lastly, inputs** such as soil fertility, water availability, planting density, and farming practices all influence yield. Quality soils and proper agronomic care help plants grow strong and healthy, unlocking their full potential.

Because of these intertwined factors, hemp yields vary not just by genetic potential but also by how well a variety adapts and is managed locally. Continuous field validation is essential to confirm performance and guide growers toward the best choices for their specific conditions.

The following table illustrates the expected yield ranges for hemp for flower, grain, and fibre and the if performance was validated in South Africa.



|                        | Yield Metrics   | Expected Yield Ranges                              | Adapted or Validated in South Africa   |
|------------------------|---|--|--|
| <b>Hemp for flower</b> | Yield in Flower:<br>Yield in CBD:<br>Yield in Biomass:<br>Yield in Fiber: | 300-800kg/ha<br>1 to 8%<br>5-10MT/ha<br>5-15%      | Not formally validated since historically associated with dagga                                    |
| <b>Hemp for grain</b>  | Yield in Grain:<br>Yield in Oil:<br>Yield in Biomass:<br>Yield in Fiber:  | 700-3,000kg/ha<br>Up to 35%<br>5-10MT/ha<br>15-25% | Not formally validated, although ARC have ongoing adaptation trials.                               |
| <b>Hemp for fiber</b>  | Yield in Biomass:<br>Yield in Fiber:                                      | 7-19MT/ha<br>25-35%                                | Several genetics (from EU, USA, China) extensively validated by the ARC in SA over several decades |

**Figure 15: Cultivation: How Productive Hemp Is<sup>65</sup>**

## VII. The Critical Role of Hemp Straw

As shown on the previous table, hemp grown for any purpose will always yield straw biomass. While hemp grown for fibre is grown primarily for its straw, dual-purpose and flower crops result in “residual”

<sup>64</sup> Carlson, C. H., Stack, G. M., Jiang, Y., Taşkıran, B., Cala, A. R., Toth, J. A., Philippe, G., Rose, J. K. C., Smart, C. D., & Smart, L. B. (2021). Morphometric relationships and their contribution to biomass and cannabinoid yield in hybrids of hemp (*Cannabis sativa*). *Journal of experimental botany*, 72(22), 7694–7709. <https://doi.org/10.1093/jxb/erab346>

<sup>65</sup> Interviews with seed companies and local hemp farmers. Note large variation both across hemp planted for specific purpose but even across regions even within the same country.

straw biomass. Given the sheer volume of straw, making up as at least 70% of total biomass, how it is marketed becomes important for several important reasons. First, farmers aim to market as much of the crop they produce as possible, diversifying income streams to improve their resilience to shocks. Second, the quality of straw (measured in part by fibre content but also its length, coarseness, and processability) however also varies depending on the primary desired plant part. These implications present trade-offs not only in their use-cases but also on the decisions policy makers choose. Third, straw lends hemp its characteristic diversity to hemp and responsible for the vast majority of its downstream uses. However, hemp straw is usable (and hence most valuable) downstream only once it has been separated into its component parts, since it is these processed parts that are the input feedstock for manufacturing. Finally, unlike hemp grain and flowers, both high-value products and with more reasonable bulk density, hemp straw is typically processed within proximity to cultivation sites - with considerations for industrial and spatial planning. However, the necessity of localised hemp straw processing also presents opportunities for greater local value-addition that can stimulates industrialisation, job creation, and innovation.

Below, these differences are presented first, followed by an explanation of their relevance to enabling the overall hemp business case.

### A. Straw Differences

Unlike hemp flowers and grain, which tend to be relatively uniform in their phenotypic and chemical properties across different varieties, hemp straw shows significant variation depending on the crop's intended purpose (that is, whether planted for grain or fibre). Understanding these differences is essential not only for assessing market demand and quality but also for recognising the trade-offs involved and guiding appropriate interventions.<sup>66</sup> The Figure below provides an overview of the distinctions based on productivity and marketability.

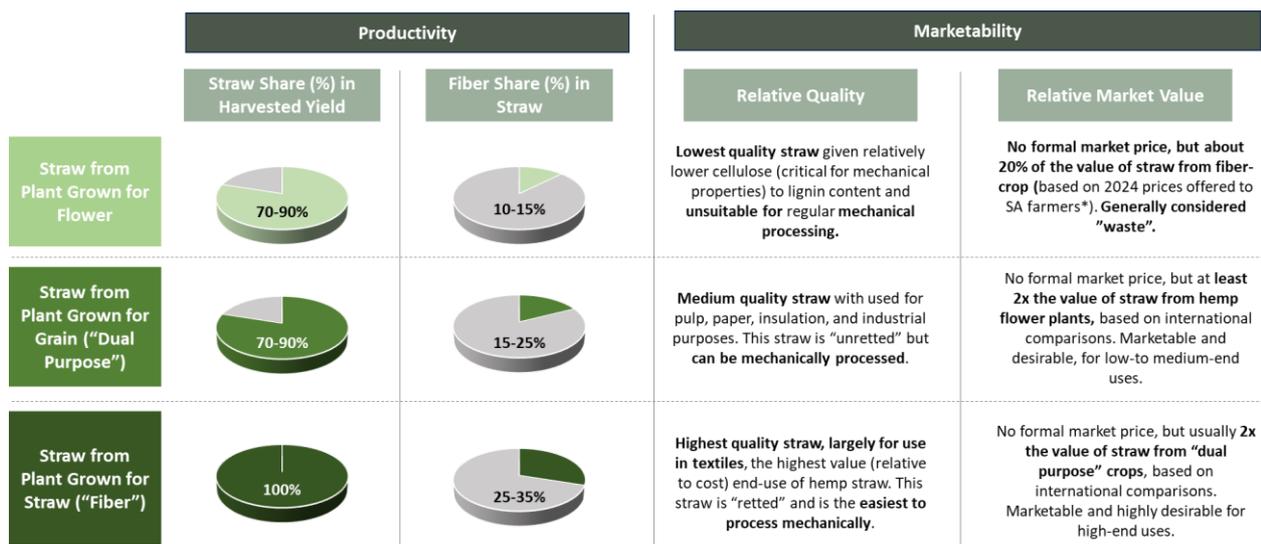


Figure 16: Cultivation How Hemp Straw Differs<sup>67</sup>

<sup>66</sup> Bócsa, I., & Karus, M. (2000). Influence of agronomic factors on yield and quality of hemp (*Cannabis sativa* L.) fibre and implication for an innovative production system. *Industrial Crops and Products*, 11(2-3), 107-119.

<sup>67</sup> Image source: Zageta Solutions, 2025.

Hemp grown for flowers produces straw that's 70-90% of the yield but with low fibre content (10-15%), making it low quality and mostly considered waste, worth about 20% of fibre crop straw prices. Grain or "dual-purpose" hemp also yields 70-90% straw but with higher fibre (15-25%), usable for pulp, paper, and insulation, valued at roughly twice flower straw's price. Fibre-specific hemp produces nearly 100% high-quality straw with 25-35% fibre, mostly used in textiles. This straw is retted for easier processing and is worth about twice as much as dual-purpose straw, making it the most valuable and sought-after type.<sup>68</sup>

## **B. Straw as an Unlock for Cultivation**

The commercial viability of hemp grown for flower or grain - often referred to as dual-purpose crops - is heavily influenced by the harvest index, which measures the ratio of "waste" (straw) to total biomass produced. Compared to maize, which has a harvest index of about 50%<sup>69</sup>, hemp is much lower at 10-15%, meaning a larger proportion of the plant's biomass is classified as straw. The ability to effectively market this "waste" is crucial to making hemp cultivation economically viable, especially when the value or unit price of the primary harvested parts (flowers and grain) is low, declining, or unstable due to market fluctuations.

Hemp's appeal lies in its "whole-plant" marketability, with nearly all parts finding commercial uses across diverse sectors. This comprehensive approach improves resilience to market shocks and minimises waste throughout the supply chain, a practice widely adopted by farmers. Importantly, straw plays a key role in unlocking downstream products that depend on farm-gate outputs like flowers and grain, which cannot be produced independently of straw.

Beyond fibre applications, hemp straw supports the broadest and most diverse range of downstream uses among all hemp plant parts (across Fibres, Fractions, and Foods products). Under ideal conditions, it can generate significant volumes for these uses. However, its low bulk density ties its economic potential closely to processing facilities located near cultivation sites, offering opportunities to stimulate localised value addition and avoid economic phenomena like Dutch disease, thereby generating multiplier effects in regional economies.

While pre-separated hemp straw has the lowest unit value among plant parts, its sheer volume means it holds the highest absolute value overall. Once processed into components such as hurds and fibre, the value of the fibre can be up to five times greater than raw farm-gate straw. Further refinement and post-processing techniques - such as cottonising, degumming, and carding - can increase fibre value by up to 40 times compared to unprocessed straw, both in relative and absolute terms.

## **VIII. Cultivation - How Farm-Gate Hemp Is Marketed**

Pricing for hemp's primary outputs - flower, grain, and straw - varies significantly and depends on distinct market considerations. None of these plant parts have yet reached commoditisation, and

---

<sup>68</sup> Ascricchi, R., Ceccarini, L., Tavarini, S., & Flamini, G. (2019). Valorisation of hemp inflorescence after seed harvest: Cultivation site and harvest time influence agronomic characteristics and essential oil yield and composition. *Industrial Crops and Products*, 139, 111541. <https://doi.org/10.1016/j.indcrop.2019.111541>

<sup>69</sup> Maurya, P., Dawson, J., and Singh, v. (2021). Harvest Index (HI) as Influenced by Total Grain Yield and Biological Yield in K-27 Variety of Maize Crop (*Zea mays* L.) under Varying Levels of Nitrogen and Plant Growth Regulators (PGR). *International Journal of Current Microbiology and Applied Sciences* ISSN: 2319-7706 Volume 10 Number 04 (2021). Journal homepage: <http://www.ijcmas.com>

their production scale remains negligible both within South Africa and globally compared to competing crops. In the absence of formal market clearing mechanisms, understanding the price discovery process is key, though a more detailed analysis will be covered in Chapter 5 Unit Economic Analysis.

- A. **Flower pricing** is generally based on volume (kilograms), with quality premiums applied for factors such as cannabinoid percentage or proprietary genetics and branding. Market access typically involves upfront negotiations with buyers, usually processors, who often dictate genetic selection and set prices offered to farmers. In South Africa, all hemp flower production is exported due to local legal restrictions and limited domestic demand. Operators in this segment tend to be price takers in global export markets unless they have developed strong brand equity to influence pricing.
- B. **Grain pricing** also follows a volume-based model, with prices varying by grade, primarily determined by oil content. Like flower, market access involves upfront negotiations with processors who influence genetic selection and pricing. Although hemp grain is already traded within South Africa, all supply is currently imported, and there is limited data available on local bottom-up economics. Operators rely on international price comparisons adjusted for import-related costs to guide their pricing strategies.
- C. **Straw pricing** is based on volume (metric tons) and varies depending on quality factors such as whether the straw is retted or unretted, and its fibre content. Market access negotiations with processors similarly influence pricing and genetic selection. South Africa lacks industrial-scale processors for hemp straw, formal quality guidelines, or pricing standards, and there is limited economic data. Unlike flower and grain, hemp straw is not internationally traded due to its low bulk density, meaning no global benchmarks exist to inform local pricing.

---

### 2.2.3. MID-STREAM - PROCESSING OVERVIEW

---

The third part of this value chain assessment, mid-stream or primary processing, is arguably the most critical since it involves the transformation farm-gate outputs into processed hemp products used as input feedstock for downstream manufacturing value addition. Just as hemp farm-gate products vary, so, too, do their respective primary processing requirements, which are tailored to their properties and end-use markets. That is, with little exception, each of hemp flower, grain, or straw is processed quite differently and each produces a wide range of commercially-ready processed products that ultimately lend the hemp market its unique and enormous diversity. While readers will recognize processes that mirror those in adjacent sectors, there are nevertheless also important novelties to consider, not least where there are currently gaps.

In this section, an outline of the processing stage of the hemp value chain is provided for each farm-gate product. A very high-level view on demand linkages, processed product outputs, technologies and their costs and scale, the degree to which these are novel to South Africa (current status), local capabilities, as well as compliance requirements is also provided. The authors disclaim that given the hemp market's nascency in South Africa, there is very scarce publicly available information on hemp processing activity and engagements with local stakeholders confirm understandable limited activity at best. This is explored in greater detail below, however it should be noted that information is sourced from a combination of desktop research and extensive engagements with hemp processing companies from 3 continents.

The assessment is presented in three parts as follows:

- I. **Flower Processing** - a general overview
- II. **Grain Processing** - a general overview
- III. **Straw Processing** - a general overview, with a particular focus on implications and considerations, some of these also explored later in Chapter 5.

## I. Primary Processing of Inflorescences

The primary processing of hemp inflorescences serves two main objectives: preparing the flowers for direct market sale or extracting valuable compounds therefrom for the purposes of downstream manufacturing. For market-ready flowers, processing involves drying, curing, and trimming to ensure product quality and consistency. Notably, hemp flowers intended for non-pharmaceutical applications (e.g., smoking flower as substitute for tobacco) may undergo much of this activity on-farm, with perhaps only the latter stages of packaging undertaken by downstream actors. For pharmaceutical hemp flower, however, compliance with standards means farmers typically market product “wet” or after drying and the rest of the activities are undertaken by a suitably licenced (under Section 22 of the Medicines and Controlled Substances Act of 1965) operator.

When intended for downstream manufacturing, advanced technologies extract cannabinoids, terpenes, and other constituents to produce crude hemp oil. This oil can then be refined or fractionated to isolate specific cannabinoids like CBD or converted into biomass forms that enhance bioavailability and absorption. These cannabinoid fractions are key ingredients in a wide range of products spanning food, beverages, cosmetics, wellness, pharmaceuticals, and even biomarking applications.

- **Input feedstock:** inflorescence (the flowering part)
- **Primary Processed (Output) Products:** flower and crude hemp extract (and derivatives)
- **Demand Pathways:** Food and Beverages (**Foods**), Cosmetics and Wellness/Pharma (**Fractions**)
- **Technology:** Processed flower products typically undergo drying and curing - often similar to tobacco methods - followed by mechanised or manual trimming and packaging. These processes are generally low-tech, employing drying rooms or barns on farms, with costs ranging from approximately R50,000 to R200,000.<sup>70</sup> Larger-scale indoor drying facilities may incorporate small-scale flower dryers and increased automation, and therefore more costly. Hemp oil extract is derived primarily using solvent-based technologies such as butane, ethanol, and supercritical CO<sub>2</sub> systems. For refinement, different refinement, distillation, crystallisation etc. technologies may be employed to tailor processed products to varying downstream demand requirements.
- **Scale and Cost:** Relative to large-scale hemp flower processing facilities, on-farm drying and curing is lower cost relative to the large scale (again, similar to tobacco barns) and ranges between R150,000 and R900,000<sup>71</sup>. The capacity for these extraction operations usually ranges between 100 and 300 kilograms per four-hour cycle, with investment costs varying from

---

<sup>70</sup> <https://www.alibaba.com/showroom/hemp-flower-drying-machine.html>

<sup>71</sup> <https://www.alibaba.com/showroom/hemp-flower-drying-machine.html>

around R500,000 to R2 million.<sup>72</sup> Supercritical CO<sub>2</sub> extraction, preferred at smaller scales for its purity and efficiency, can cost between R700,000 and R4.5 million.<sup>73</sup> These technologies, while well-established in essential oils and pharmaceutical industries globally, are largely imported, representing a significant capital and technical investment.

- **Novelty and Complexity:** Extraction technologies remain relatively novel in South Africa's hemp sector, requiring specialised knowledge and infrastructure. The integration of automation and IoT in drying and trimming processes is increasing, enhancing efficiency and quality control.
- **Local Capabilities:** Local capabilities support both processing streams. Human capital for processed flower production draws on expertise from adjacent sectors like tobacco, natural smokables, and cannabis, with growing integration of automation and Internet of Things (IoT) technologies. Extraction technologies benefit from existing South African experience in essential oils and are bolstered by a limited number of Section 22 licensed facilities regulated by the South African Health Products Regulatory Authority (SAHPRA).
- **Compliance:** Compliance is critical across both processed flower and hemp extract production. Operators must secure a Section 22C license from SAHPRA and adhere to Good Manufacturing Practices (GMP). Additionally, compliance with Good Agricultural and Collection Practices may be required, particularly to ensure traceability and meet the quality standards of downstream markets such as food and pharmaceuticals.

In summary, hemp flower processing spans a spectrum from low-cost, small-scale on-farm activities to capital-intensive extraction operations requiring specialised technology and regulatory compliance. While local capabilities are developing, much of the advanced extraction infrastructure is imported, reflecting both opportunity and challenge in scaling South Africa's hemp processing industry.

## II. Primary Processing of Grain

The primary processing of hemp grain serves to prepare the seed either for direct marketing or for further value addition through downstream manufacturing. For market-ready grain (whole hemp seed), this involves cleaning, grading, sorting, and testing of hempseed. Given that grain must be dried shortly after harvest, much like for other grain grown in South Africa, it is often done on-farm alongside some "pre-cleaning" before marketing to aggregators (e.g., silos) or processors. However, there are not yet established business models for the hempseed sub-sector and no known aggregation, despite demonstrated interest from large local grain players seeking to access new and diverse markets.

For further manufacturing, the first technology typically requires some form of cracking (also called dehulling or de-husking) to separate the hempseed kernel from its outer shell. Depending on intended end-use, various technologies are applied to convert dehulled seeds into liquid (e.g., hempseed oil) and solid (e.g., hemp seed meal or seedcake) products that become the raw material inputs for downstream demand.

- **Input feedstock:** Dried and pre-cleaned whole hempseed with shell or dehulled hempseed.

---

<sup>72</sup> <https://www.alibaba.com/showroom/hemp-flower-drying-machine.html>

<sup>73</sup> <https://extractionmagazine.com/category/applied-technology/supercritical-fluid-extraction-pricey/>

- **Primary (Processed) Output products:** The main product outputs include (i) whole hempseed, (ii) hemp seed meal or flour, and (iii) hemp oil, with hempseed cake as a byproduct. catering to demand pathways spanning food and beverages, animal and pet feed, cosmetics and pharmaceuticals, and biofuels.
- **Demand Pathways:** Food and Beverages (**Foods**), Animal/Pet Ingestible (**Feeds**), Cosmetics and Wellness/Pharma (**Fractions**), Bio-Fuels (**Fuels**)
- **Technology:** Processing technologies for whole hempseed include seed conditioning technology (cleaning, sizing, sorting, grading etc.) very similar to those used for other grains but tailored to hempseed's specific size, shape, and weight. For hempseed meal, milling equipment is used to convert whole hempseed into flour of varying grades and particle sizes. For hempseed oil, various hot and cold pressing or crushing technologies are used depending on intended end-use. Additionally, processors will also typically invest in sterilisation technology ranging from irradiation to steam, as well as in-house labs for internal testing<sup>74</sup>, to ensure that products meet demand requirements.
- **Scale and cost:** The scale of technology for both conditioning and processing hemp grain varies widely in both cost and scale, ranging from laboratory to industrial. Conditioning equipment<sup>75</sup> can range from inputs capacities of several kgs to many MT per hour, with cost ranging from R30,000 to several million. Similarly, dehulling equipment ranges from small-scale units processing 50 kilograms per hour to large-scale systems exceeding 400 kilograms per hour, with costs from approximately R30,000 to over R400,000. Milling machinery also varies significantly, handling from 0.5 to over one metric ton per hour, costing between R40,000 and R500,000, with additional expenses for product sterilisation methods such as irradiation or steam treatment (or any additional refining machinery and automation) which may add several hundreds if not millions of Rands in costs. Pressing equipment can handle between 5 and 100+ kilograms per hour, with investment costs ranging from R20,000 to R400,000.
- **Novelty and complexity:** All grain processing technology used for hemp is very well-established and characterised by low complexity. For example, dehulling is one of the earliest agro-processing technologies developed by humans while milling and pressing are ubiquitous, with many of these modifiable for varying grain types and scalable. Sterilisation technologies range in complexity and are driven by end-use market requirements; for example, irradiation technologies are well-established and less costly than steam sterilisation but technology option driven by sterilisation standards where those end products are manufactured or consumed.
- **Local Capabilities:** South Africa benefits from long-standing local capabilities in dehulling, milling, and pressing, paralleling the country's broader oilseed processing sector. From a capacity perspective, the soybean industry alone can crush +2 million metric tons annually - far exceeding the projected hemp grain volume from 20,000 hectares, which would represent less than 1% of this capacity. With modification, and considering hemp grain as a rotation crop

---

<sup>74</sup> This is typically small-scale and used internally for aligning production in accordance with intended output quality. For marketing purposes, 3<sup>rd</sup> party laboratories are used instead and often these are approved by the buyer.

<sup>75</sup> Conditioning equipment in the context of hemp grain processing refers to the machinery and tools used to prepare the harvested hemp seeds for further processing steps like dehulling, milling, or pressing.

This preparation can include cleaning (removing dirt, debris, and foreign materials), drying to the right moisture content, temperature control, and sometimes sorting or sizing. The goal is to optimise the quality and consistency of the seeds or grain before they enter the next phase of processing, ensuring better efficiency and product quality downstream.

for other oilseed crops, it is feasible that hemp grain can feasibly increase capacity utilisation of processing facilities without large additional requirements. The sector also benefits from solid human capital built and transferred over centuries of cultivation and processing experience.

- **Compliance:** there are no known hemp-specific compliance requirements whether for process or product. It is assumed that grain processing would need to comply with those applied to other grain sub-sectors including for e.g., Good Manufacturing Practices (GMP), standards outlined in the Agricultural Products and Foods Acts, and provisions in the Plant Improvement Act for seed intended for sowing. Products must also meet quality and safety standards relevant to their end-use sectors, such as food, fuels, feeds, and cosmetics and these are governed by their own sets of standards and regulations. Further, there are no known SABS standards. Finally, since grain is ingestible, there are important considerations regarding maximum thresholds of trace amounts of naturally occurring cannabinoids (including THC) and there are no published guidelines either from the Departments of Agriculture or Health regarding standards and regulations.<sup>76</sup>

In summary, grain processing shows the greatest potential in South Africa given the type, cost, familiarity, and complexity of technology, coupled with longstanding local knowledge in oilseed cultivation and production more generally (not least since grain crops such as maize and sorghum are national staples). Scale is an important consideration for optimising the costs of downstream product, but the quantum of supply required is also important in cultivation terms since farmers are yielding roughly 1MT of grain per hectare per season (global average). This may be less of an issue given the general substitutability of processing technology across multiple grain types, meaning that utilisation is optimised by adding a mix of grains and in that sense hemp adds to, rather than displaces, other grain crops. Notwithstanding the quantity and quality of upstream supply, both local and international grain processors noted a keen interest in adding hemp into their product portfolio mixes and, particularly for local operators, demonstrated a keenness to explore further as this hemp is still relatively novel albeit “very high potential” grain.

### III. Primary Processing of Straw

The primary processing of hemp straw focuses on crushing or separating the straw into its component parts for marketing or further refinement and manufacturing. Based on the intended end-use, these components are either chemical (e.g., cellulose, where straw is used for Fractions products) or physical (e.g., fibres or hurds used for Fibres products).

A variety of fractionation (a form of extraction) technologies (e.g., thermal or chemical) used to separate hemp straw into its bio-refinery constituents such as cellulose, hemi-cellulose, lignin, pectins, waxes, 2<sup>nd</sup> generation sugars etc. that find widespread industrial applications. These can then be refined to meet market requirements. By comparison, mostly mechanical methods are used to separate hemp straw into fibres and hurds, this done via a series of crushers, rollers, and combs. The separated parts can also be further refined to achieve desired specifications outlined by different downstream buyers across an exceptionally large variety of end-use markets.

- **Input feedstock:** Retted/unretted hemp straw

---

<sup>76</sup> This is discussed in greater detail in Chapters 3 and 6.

- **Primary processed (output) products:** The main product outputs include bast fibres (both staple and tow), hurds, green waste, and hemp fractions.
- **Demand Pathways:** Fibres (textiles, building materials, composites) and Fractions (foods, fuels, cosmetics, bioplastics)
- **Technologies:** processing hurds and fibres rely exclusively on mechanical methods with varying degrees of refinement. Typical technologies include decorticators, scutchers, and hammermills, all of which crush, separate, resize, and/or refine the straw and its separated hurds and fibres. While hammermills can be used for different straw inputs, decorticators and scutchers are fabricated specifically and exclusively for hemp.<sup>77</sup> For fractionation, a broader array of technologies - including mechanical, chemical, and thermal processes - are employed to separate the straw into cellulose, lignin, and other components. Notably, input feedstock may need to be pre-crushed prior to fractionating, therefore also requiring hammermills. While no commercialised hemp-specific fractionation technologies are known, other general fractionation technologies vary in terms of their sensitivity input-feedstock.
- **Scale and cost:** Hammermills range from small R&D- (10-50 kg/hr input) to industrial-scale (+2.5 MT/hour input), with costs spanning from roughly R150,000 to over R150 million. Since these are also used for the pulp and paper industry where volumes are very large, most commercial operators in South Africa operate very large facilities. Fractionation technologies share similar characteristics since they are also used in the Forestry industry, with capacities ranging from 5,000-+100,000 MT/annum and costing from several hundreds of thousand Rands to over R500 million. By comparison, there are few “mid-scale” decorticators and scutchers, with the market offering either R+D- (50-100kg/hr input capacity) or industrial-scale (1MT/hr input capacity). OEMs engaged in this study noted minimum viable scales of 1-2 MT/hr <sup>78</sup> input capacity and at least R60-R250 million investment for turnkey projects, depending on operational and product complexity.
- **In terms of novelty and complexity:** hammermills present low novelty and complexity and are fairly ubiquitous across several key provinces in South Africa. Separation technologies such as decortication and scutching are more novel and feedstock-specific, with medium to high complexity particularly in fibre refinement. Fractionation technologies are not novel but involve relatively high complexity and can often accommodate diverse feedstocks.
- **Location of operations:** Due to cost sensitivity of transporting the hemp biomass, farmers have to be located max 100km from the processing facility.
- **Local capabilities:** hammermill operations abound in South Africa given an established Forestry sector. However, there is a glaring and notable absence of industrial-scale separation technology anywhere in South Africa (or the African continent, or indeed the Southern Hemisphere), representing a critical gap in the current value chain (this is discussed in more detail further below). While there are fragmented local technical capabilities (largely from the CSIR/NMU hemp hub), mechanical processing for the most part does not require specialised skills and may be suitable for operators experience in other agro-processing sub-sectors. Fractionation capabilities are more developed but are concentrated within the Forestry

---

<sup>77</sup> In some cases, this technology can, with varying degrees of effort, also be modified to accommodate only other bast fibres such as flax, kenaf, or ramie.

<sup>78</sup> This is the theoretical capacity as this can vary due to other considerations include straw quality.

subsector, including pulp, paper, packaging as well as in bioplastics and man-made cellulosic fibre products like viscose and lyocell. It is unclear whether hemp-specific capabilities exist locally.

- **Compliance:** currently, there are no formal compliance beyond adherence to Good Manufacturing Practices (GMP) and other ISO requirements, as well as industry, product, or process specific standards, there are no known requirements in South Africa specific to the processing of hemp straw. Instead, standards are primarily driven by downstream users and manufacturers who enforce quality through third-party certified testing aligned with ISO, SABS, ASTM, or similar standards.

### **The Criticality of (Mechanical) Straw Processing**

Downstream or manufactured hemp products are derived from *processed* hemp products that require varying levels of effort to transform them from their farm-gate sources. Marketed grain and flower requires relatively less effort to transform them into usable forms for their end-uses and are marketable to buyers across manufacturers, retailers, and final consumers (e.g., smokable hemp flowers or whole hempseed). By comparison, farm-gate straw is only marketable to straw processors since further downstream users cannot use it in its pre-separation form; that is, straw processing is indispensable to meeting all downstream demand requirements for fibre and hurd raw materials used in widely different applications. This is particularly important for straw suitable for mechanical processing - that is, excluding straw from hemp grown for flower - and for which the most common and cost-effective processing technology is decortication or scutching. Through these separation technologies, straw unlocks hemp fibres and hurds that responsible for the vast majority of all downstream end-use products as a share of both total volumes and diversity. Without them, bridging supply and demand becomes impossible.

Crucially, **South Africa does not have any industrial-scale mechanical straw processing capability**, raising several considerations and implications, which are briefly explored below:

- **Markets for farmers (commercial viability)**

All hemp - that is, hemp grown for all purposes - will yield some type of straw biomass, which constitutes at least 70% of total harvested biomass. Farmer growing for flower, since current prices are relatively high, do not currently require a market for their straw and it is generally considered waste used for mulching, composting etc. (see more below). However, for all other hemp farmers, access to market is a prerequisite since they need some incentive to undertake farming. This is particularly important since hemp is not yet a “commodity” and trade depends on guaranteed market access, and working capital requirements are also high relative to many other comparable crops (see more in Chapter 5). To ensure commercial viability (and enabler other support, including financing), farmers require guaranteed markets for this straw, which straw processors provide. This is generally important but more so in South Africa where an ostensibly supply-side approach has been pursued, focused on issuing permits to farmers ahead of ensuring them market access. One can reasonably assume that limited current production is, notwithstanding regulatory challenges, a reflection of lack of market access.

- **Unlock for other non-fibre demand pathways (and all hemp cultivation)**

While grain and flower are much higher value products relative to straw, they yield significantly less volume (output per ha) while still resulting in “residual” straw. If prices (and volumes) for grain and flower are sufficiently high, then farmers are able to run commercially viable operations without

needing to worry about having to market their straw. If markets for those plant parts rationalises, however, then the marketing of “residual” straw is imperative for balancing the books. For example, hemp flower farmers whether in South Africa or elsewhere have faced declining CBD prices (the most prized component in hemp flower) globally. Farmers are increasingly considering markets for their straw otherwise their cultivation business cases may be challenged in future. Unlike hemp flower farmers, dual-purpose crop farmers market both their grain and straw given that their lower straw yield is offset by much lower-volume but significantly higher-value grain, ultimately ensuring a commercially attractive crop. The market for straw is therefore indispensable not only for hemp grown for fibre but also for ensuring a positive business case for hemp grain cultivation business case as well as associated non-fibre uses-cases including Foods and Feeds.

- **Supply for processors (commercial viability)**

Notwithstanding demand, the utilisation of processing machinery is a major driver of commercial viability for operators. Operators in sub-sectors relying on seasonal supply of raw materials and/or single feedstocks are particularly sensitive to this. Hemp is no different in that sense, but this is exacerbated by a low bulk-density (high volume, low weight) feedstock that is costly to transport. In South Africa’s nascent hemp industry, it may take several years to build sufficient supply stocks to ensure minimum utilisation for processors to run commercially viable operations.

This has implications for how straw processors are financed and the types of instruments that may reduce burdens and. It is not inconceivable, however, that, provided a good return to farmers and enabling environment as well as leveraging the country’s agricultural capabilities, supply stocks are built rapidly over the next several years to also enhance hemp’s business case. This is explored in more detail in Chapter 5.

*“The problem is we can’t get the hemp biomass. We went to Stellenbosch, we went to CSIR and they’ve got pilot plants but not at scale. The problem has always been finding enough feedstock.”*

*(Int 9, South African Oil company)*

- **Price Discovery**

The Cultivation sub-section above introduces some issues related to output marketing. There are no formal market clearing mechanisms for hemp products and therefore no formal price discovery process.

Establishing an industrial-scale hemp processing facility is capital intensive, with costs estimated at a minimum of R200 million, a sensitivity felt by market actors. Even with market access for processed products, operational viability depends on a guaranteed, sustainable supply of quality feedstock. Without this assurance, investors and businesses are unlikely to assume the high risks involved, as supply instability would severely impact projected returns. Currently, South Africa has no industrial-scale mechanical hemp processing facilities, and any new facility would require 24 to 36 months to become operational.

*“The big issue is processing and that means a huge investment that we’re not capable of.”*

*(Int 14, South African Hemp Retailer)*

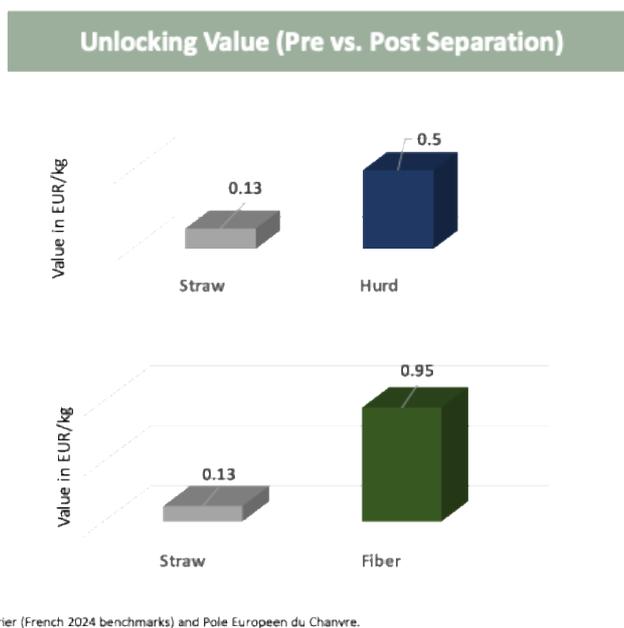
This interdependence between supply and processing infrastructure highlights the fundamental challenge facing South Africa’s hemp sector - a coordinated approach is needed to break this cycle and enable industry growth. The government must send clear, consistent signals to potential investors to build confidence in the sector’s future, including, establishing supportive policies that guarantee supply chain stability, streamlining regulatory frameworks to reduce uncertainty, and

providing incentives or de-risking mechanisms that encourage investment in processing infrastructure.

- **Value-Addition**

In terms of value, processing dramatically increases straw's worth. Pre-separation straw is valued at about 0.13 EUR per kilogram, while separated hurd commands roughly 0.5 EUR per kilogram. Similarly, fibre value jumps from 0.13 EUR pre-separation to approximately 0.95 EUR post-separation, underscoring the economic importance of mechanical processing in unlocking hemp straw's full commercial potential.

Assuming that 50% of the 23,000 hectares under permit are planted for fibre or dual-purpose hemp, the total straw output would exceed 100,000 metric tons. Meeting this demand would require approximately four processing facilities, each with a capacity of 2.5 metric tons per hour. Currently, no industrial-scale facilities of this kind exist in South Africa, and no country has established a competitive hemp industry without such infrastructure.



**Figure 17: How Hemp Straw Unlocks Value<sup>79</sup>**

## 2.2.4. DOWNSTREAM - MANUFACTURING WITHIN A DEMAND-LED VALUE CHAIN

South Africa's downstream hemp landscape is characterised by uneven development across sectors, reflecting differences in regulatory clarity, technological readiness, and alignment with existing industrial infrastructure. In some cases, established agro-processing, manufacturing, and retail systems provide a strong foundation for hemp integration. In others, downstream activity remains nascent, constrained by regulatory uncertainty, limited primary processing capacity, and unresolved technology and cost barriers.

<sup>79</sup> Zageta Analysis, 2025, based on price data sourced from France in 2024 season.

This section provides a high-level overview of how processed hemp inputs—including grain, bast fibres, hurds, inflorescences, and derived oils—are translated into value-added products across key sectors in the South African economy. It focuses on five priority demand pathways identified through prior research: food and beverages; construction and building materials; textiles; wellness, pharmaceuticals, and cosmetics; and plastics and bio-composites. For each pathway, the discussion highlights the current level of market uptake, core industrial processes, sector maturity, regulatory considerations specific to hemp, and the primary opportunities and constraints shaping development.

This analysis is not intended as a detailed market sizing or demand forecast. A comprehensive assessment of market dynamics and growth potential is presented in Chapters 3 and 4. Rather, the purpose here is to situate each downstream pathway within the broader industrial context, illustrating how differences in processing requirements, regulatory treatment, and infrastructure readiness give rise to markedly different development trajectories—from relatively mature food and beverage applications to emerging and experimental uses in construction, wellness, and bio-based materials.

### **Food & Beverages (Mature)**

The food and beverage sector is a central pillar of South Africa’s agro-processing economy, supported by established multinational and domestic players such as Unilever, Tiger Brands, and Fattoria. From a processing and market perspective, this sector is the most mature downstream pathway for hemp, as grain-based applications rely on conventional food manufacturing technologies including dehulling, cold pressing, milling, blending, and packaging.

Despite this structural readiness, commercialisation of hemp-based foods remains limited. Regulatory uncertainty, particularly around Department of Health notices governing hemp as a food ingredient, has constrained investment and scale. In parallel, limited availability of certified seed and domestic processing capacity has slowed market development. Institutions such as the ARC, SANSOR, and local SMEs are actively addressing these constraints through seed certification initiatives and pilot-scale processing.

Key enabling conditions include clearer regulatory guidance from DALRRD and the Department of Health, investment in processing infrastructure such as dehullers, oil presses, and protein isolators, and the establishment of recognised standards and certifications including SABS, HACCP, and export food-grade accreditation. Persistent caution around both animal and human consumption reflects reputational and compliance risks. Nonetheless, strong consumer demand, established retail channels, and compatible industrial infrastructure position food and beverages as the most immediately scalable hemp sector.

*“It’s not just another raw material that can be replaced because of the perception of the ingredient itself.” (Int 15, Commodity Association)*

### **Construction & Building Materials (Nascent/Emerging)**

Hemp-based construction materials, including hempcrete and insulation, are at an early but increasingly visible stage of development in South Africa. Interest in this sector is driven by tightening building regulations, sustainability objectives, and growing concern over climate change impacts. Core production processes, mixing hurds with binders, moulding or block forming, and curing, are technically feasible and transferable from existing construction material manufacturing systems.

*“We’re involved in some projects where we’re replacing glass fibre, which we’ve successfully... already kind of doing.” (Int 12, Construction company)*

Market uptake remains limited and largely project based. A critical inflection point is anticipated with Agrément certification, expected to unlock broader acceptance by regulators, developers, and insurers. Enabling conditions for sector growth include SABS testing and product standards, formal recognition of hemp materials within green building codes, tax incentives for sustainable construction inputs, and the development of local supply chains to ensure consistent availability of hurds and lime-based binders.

Industry interest is already evident, while technical feasibility has been demonstrated, the sector remains nascent, dependent on regulatory standardisation and supply chain maturity to transition beyond pilot applications.

### **Textiles (Existing but Limited)**

South Africa’s textile sector provides a partial foundation for hemp fibre integration. Existing spinning, weaving, and apparel manufacturing capacity, combined with rising demand for decarbonised and natural fibres, creates a clear market opportunity. Hemp textiles are increasingly positioned as premium products, as reflected by a local retailer.

*“...green textiles... immediately creates a situation where the product becomes a premium or very luxury product.”*

*(Int 14, South African Retailer)*

However, the sector faces significant structural bottlenecks. The primary constraint lies in fibre processing, specifically decortication and scutching, cottonisation, and spinning. Much of the required equipment is capital-intensive, outdated, or unavailable locally, limiting scale, consistency, and cost competitiveness. As a result, hemp textiles exist in South Africa but remain constrained to small-scale or niche applications.

Enabling factors include targeted investment in fibre processing infrastructure, integration with established textile clusters in KwaZulu-Natal and the Western Cape, and market development initiatives that position hemp textiles as high-value, sustainable alternatives. With these interventions, the sector could shift from limited to more robust industrial participation.

### **Wellness, Pharma & Cosmetics (Existing but Developing)**

The wellness, pharmaceutical, and cosmetics sectors represent an established but tightly regulated downstream pathway for hemp. Inflorescences are processed into oils, isolates, and concentrates using extraction, distillation, and formulation technologies that are already present in South Africa at small to medium scale. Consumer demand for cannabinoid-based wellness and cosmetic products continues to grow, supporting ongoing industry participation.

Regulatory complexity remains the principal constraint. Streamlining SAHPRA licensing pathways, particularly for SMEs, is a critical enabling condition, alongside clear guidance on permissible CBD limits in over-the-counter wellness products (currently under 20 mg per day). Industry-research partnerships, supported by funding for clinical trials and formulation development, are essential to move beyond basic extracts into higher-value, differentiated products.

*“Concerns must be addressed, particularly around CBD/THC levels, food safety, and market access.” (Int 16, Farmer Association)*

Concerns regarding compliance and market access persist, as highlighted by a Farmer Association representative. While the sector is clearly operational, its development trajectory depends on regulatory certainty and investment in compliant processing and testing infrastructure.

### Plastics & Bio-Composites (Nascent/Emerging)

Plastics, bio-composites, and biofuels represent the least mature downstream pathway for hemp in South Africa. Activity in this sector is largely confined to research and development, with exploratory applications in automotive components, building panels, packaging materials, and renewable fuels. Core processes, i.e., fibre processing, polymer compounding, extrusion, moulding, and blending, are compatible with South Africa's existing plastics and automotive manufacturing base, but hemp-specific applications remain experimental.

*"Part of the problem, of course, is that it's got to be brought into parity with the price point for existing fuels. This is always the challenge with these new and emerging fields, and it's one of hemp's challenges as a material substitute." (Int 8, Energy and chemical company)*

A consistent supply of appropriately processed biomass is a prerequisite for commercial viability, and its absence remains a major constraint. Enabling conditions include dedicated funding for R&D commercialisation, particularly in bioplastics, resins, ethanol, and biodiesel; partnerships with automotive, packaging, and energy firms; and supportive policy frameworks aligned with circular economy and renewable fuel standards. Cost competitiveness remains a central challenge. As such, this sector represents long-term strategic potential rather than a near-term commercial driver.

### Key Takeaways from Chapter 2:

Chapter 2 lays out a structured, demand-led framework for understanding South Africa's emerging hemp sector, underscoring why segmentation is crucial for coherent industrial development. By clearly distinguishing hemp from intoxicating cannabis in regulatory terms, the chapter positions hemp as a versatile agricultural and industrial commodity that can integrate into established economic sectors. Importantly, hemp is not a single product but a constellation of differentiated value streams - demand pathways - each with distinct technical requirements, market specifications, and industrial capabilities. The 5F framework (Farming, Foods, Feeds, Fibres and Fractions) provides the organising logic, ensuring analysis starts with end-use demand and cascades backward through cultivation, processing, and regulatory design.

This approach clarifies why hemp, unlike dagga, offers a viable platform for diversified value addition, capability building, and scalable industrialisation in South Africa. The framework developed here underpins all subsequent analyses - from demand assessment and benchmarking to capability mapping and prioritising investment opportunities.

Through this demand-oriented lens, the study examined the hemp value chain across the 5F segments, identifying major demand pathways alongside critical value chain stages, drivers, actors, regulatory frameworks, technologies, capabilities, and processes ripe for optimization. The Value Chain Assessment presents a solid evidence base to conceptualise the demand pathways, including capabilities, that must be developed to seize these opportunities. It also outlines the policy tools and stakeholder ecosystems essential for building sector competitiveness.

The evidence highlights the complexity of hemp as a crop and the significant challenges South Africa faces in developing a robust hemp value chain as it demands targeted interventions and a whole-

value-chain approach as the foundation for successful industrial development. The assessment spans upstream seed genetics, on-farm cultivation practices and their geographic distribution, midstream scale considerations, costs, and capabilities - showing how the plant's characteristics shape value chain development at each stage.

While developing this industry will take time and careful planning, hemp's diversification opportunities, unique plant attributes, and relevance to South Africa's agricultural and industrial context make it a compelling and strategic investment prospect.

What remains is to prioritise hemp demand pathways and vertically integrated value chain opportunities where South Africa can be competitive - that is, where sustainable market demand exists, productive capabilities are evident, and price competitiveness can be achieved, accounting for credit subsidies and other policy incentives. This prioritisation will be informed by a comprehensive global demand assessment, local market sizing, and economic complexity analysis to identify frontier products that are both feasible and desirable.

# Ch 3: Demand Assessment

---

Hemp's structure, cultivation and production value-chain have been established in Chapter 2. This chapter now considers the industrial hemp market, assessing both global and local demand, using both quantitative and qualitative evidence. Given the emerging nature of the sector and limited data availability, this chapter provides a high-level assessment designed to capture key demand trends and insights. The chapter's analysis is presented through two complementary lenses: an outside-in view that examines global demand trends, and an inside-out perspective focusing on South Africa's domestic market. The first section provides a high-level global demand assessment, highlighting key drivers, emerging industrial pathways, and regulatory factors - both challenges and enablers - that influence market dynamics. This section also considers how new entrants like South Africa can strategically position themselves to capture growth opportunities in the expanding hemp sector.

The second section turns inward, offering a quantitative and qualitative evaluation of current and projected domestic demand for hemp products in South Africa. Given the nascent stage of the local industry and regulatory constraints on cultivation, this assessment faces significant data limitations. South Africa's industrial classification systems and international trade statistics do not yet fully capture hemp-related economic activity, making precise measurement difficult. To address these gaps, the analysis is supplemented with insights from stakeholder consultations, providing a nuanced understanding of market potential and realistic opportunities.

This assessment is informed both by extensive desktop research and subject matter expert interviews and is divided into two sections: 1) The Global Demand Assessment - Outside-in view and 2) Domestic Demand Assessment - Inside-out view

Together, these two perspectives create a robust foundation for the prioritisation of five key demand pathways outlined in Chapter 4.

## 3.1 Global Demand Assessment

---

### 3.1.1. HIGH LEVEL GLOBAL DEMAND OVERVIEW

---

The global hemp market spans agricultural outputs, industrial commodities, and human-consumption goods, making it one of the most diversified bio-based sectors internationally. This section provides a high-level desktop review of global demand patterns, synthesising quantitative insights drawn from six of the most frequently cited market intelligence sources, namely Grand View Research, Zion Market Research, Markets and Markets, Data Bridge Market Research, and Precedence Research.

## I. The Growing Scale and Scope of Global Demand<sup>80</sup>

The industrial hemp market is undergoing a remarkable transformation, shifting swiftly from a niche agricultural product into a mainstream, versatile commodity. Market projections estimate a robust increase in value from \$10 billion in 2025 to about \$37 billion by 2032.<sup>81</sup> This significant growth in demand comes from sectors as diverse as human and animal food, textiles, pharmaceutical and health products, biofuels and building materials. As seen in the illustrative sector shares in Figure 18, market share is dominated by textiles, food and beverages, and personal care.

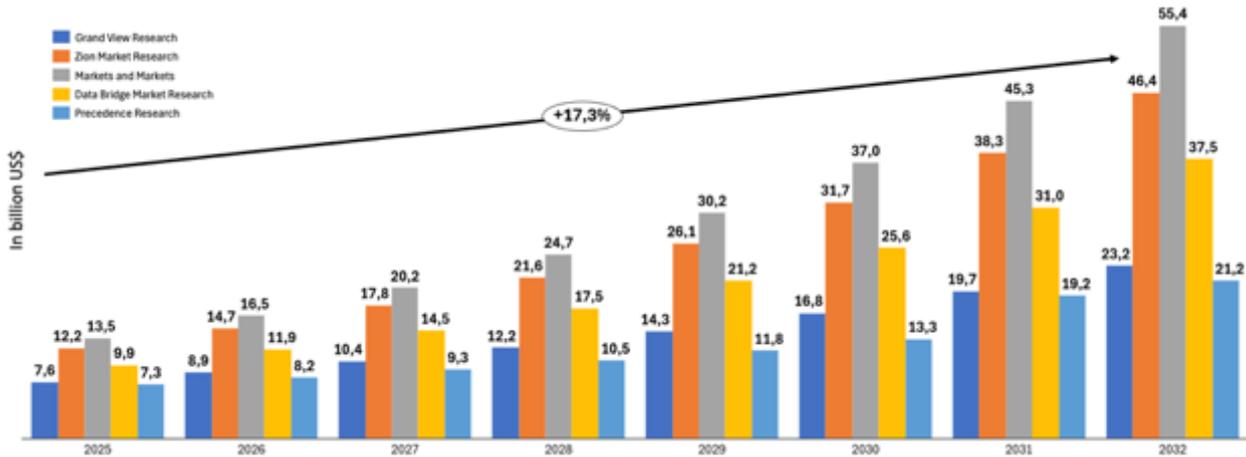
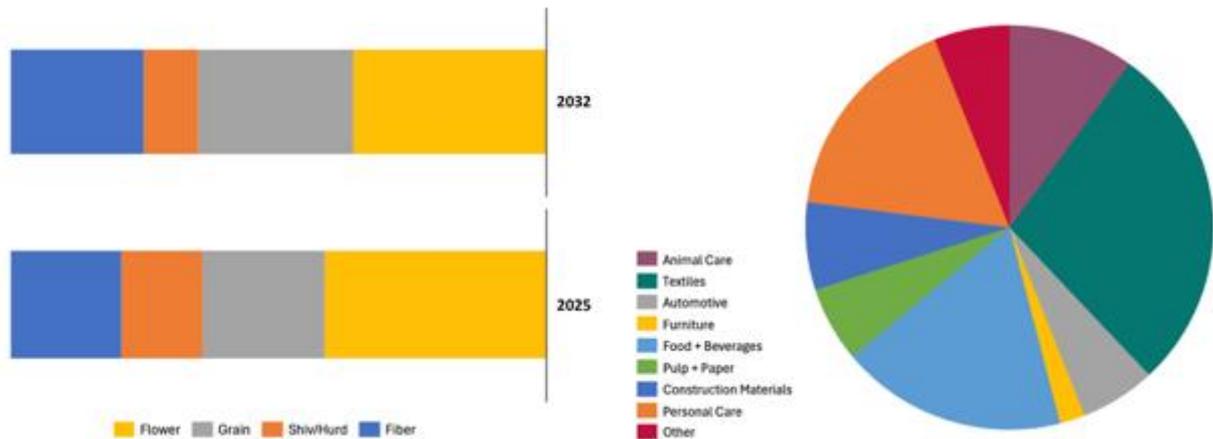


Figure 18 Estimated average hemp market size and growth (2025-2032)<sup>82</sup>

<sup>80</sup> Disclaimer: The market share figures presented in the graphs are illustrative and intended to provide a high-level overview of the global hemp sector. Data from six leading market intelligence reports - including Grand View Research, Zion Market Research, Markets and Markets, Data Bridge Market Research, and Precedence Research - were synthesised for this analysis. However, due to the absence of standardised Harmonized System (HS) codes for hemp products and varying definitions across sources (notably exclusions of CBD categories in some datasets), direct numerical comparisons are not feasible. Additionally, discrepancies in reporting methodologies and geographic coverage further limit precise quantification. As such, specific numerical values have been deliberately omitted to avoid misinterpretation. Supplementary data from the FAOSTAT database (accessed October 2025), UNCTAD, and expert inputs have informed this analysis. Users are advised to interpret the illustrated market shares as indicative rather than definitive.

<sup>81</sup> Sources: 6 of the most cited and recent reports from 6 leading market intelligence companies (including Grand View Research, Zion Market Research, Markets and Markets, Data Bridge Market Research, and Precedence Research – see reference for detailed sourcing) – note CBD exclusions, given data limitations across the globe); FAOSTAT Database (accessed October , 2025); UNCTAD; Zageta analysis. \*Note: According to stakeholder expert, last year China planted 95,000ha.

<sup>82</sup> Zageta Solutions, 2025, based on data from global hemp market reports (GrandView Research, Zion Market Research, Markets and Markets, Data Bridge, and Precedence Research).



**Figure 19: Critical demand segments: revenue share by product (left) and revenue share by end-use (right)<sup>83</sup>**

The wide scope of industrial hemp sets it apart from the more narrowly focused CBD market. While CBD centres on flower and extracts for wellness products, industrial hemp covers a diverse array of fibres, grain, manufacturing inputs, and energy feedstocks. Countries that have established clear regulations distinguishing these uses have successfully fostered the growth of distinct demand pathways, attracting targeted investments for value chain integration and growth.

## II. Key Growth Markets

Mature markets like North America, Europe, China, and Canada continue to lead hemp innovation, backed by advanced supply chains and clear regulations that create strong industrial hemp ecosystems. New players are joining in, drawn by loosening hemp laws and rising consumer demand for sustainable, bio-based products. These entrants often add supply outside traditional Northern Hemisphere harvest cycles, helping ensure global availability throughout the year - South Africa is a good example.

In any market assessment, demand highlights where growth could happen, but supply reveals the reality on the ground. Supply shows the “as-is” picture - what is actually being grown, harvested, and processed today. Supply sets the baseline for what the market can fulfil now and near-term, exposing bottlenecks, regional strengths, and weaknesses that shape the industry’s true potential.

China, for example, remains the world’s largest hemp straw supplier, cultivating 32,000 hectares in 2023 and producing 145,000 metric tons in 2022. China has strong downstream processing capacity but may lack sufficient domestic fibre supply, creating a natural space for international partnerships and trade. Genetic improvements have boosted fibre yields dramatically over the last decade, reshaping what supply can deliver.

Canada, the world’s largest seed producer, dedicated 22,100 hectares to nearly 25,000 metric tons in 2023, supported by strong infrastructure and financing. Russia, Chile, and Ukraine also play major roles - together with Canada, they account for more than 90% of global hemp supply by area and

<sup>83</sup> Ibid.

production. Investments to improve grain yield aim to make hemp more competitive against other crops, especially for large-scale uses like animal feed and biofuels.

On the demand side, Europe’s appetite for hemp fibre in textiles and automotive parts grows alongside increasing acceptance of hemp grain products in food and wellness, spurred by green policies. The U.S. dominates the CBD market, holding over 80% of revenues and standing as the largest consumer of all hemp products. Together, Asia-Pacific, North America, and Europe make up 90% of global hemp demand, reflecting not only wealth and consumption but also the presence of strong downstream manufacturing close to consumer demand.

Emerging sectors like sustainable construction materials, advanced textiles, bio-composites, and hemp-based wellness and cosmetics benefit from environmental urgency and technological progress.

Mature markets such as North America, Europe, China, and Canada maintain their role as innovation leaders, their advanced supply chains and regulatory clarity fostering robust industrial hemp ecosystems.

A growing number of new entrants is emerging, attracted by the loosening of cannabis-related legal restrictions and increasing consumer demand for bio-based, sustainable products. These new players offer complementary supply, often outside traditional Northern Hemisphere harvest cycles, thereby enhancing global year-round availability, like South Africa.

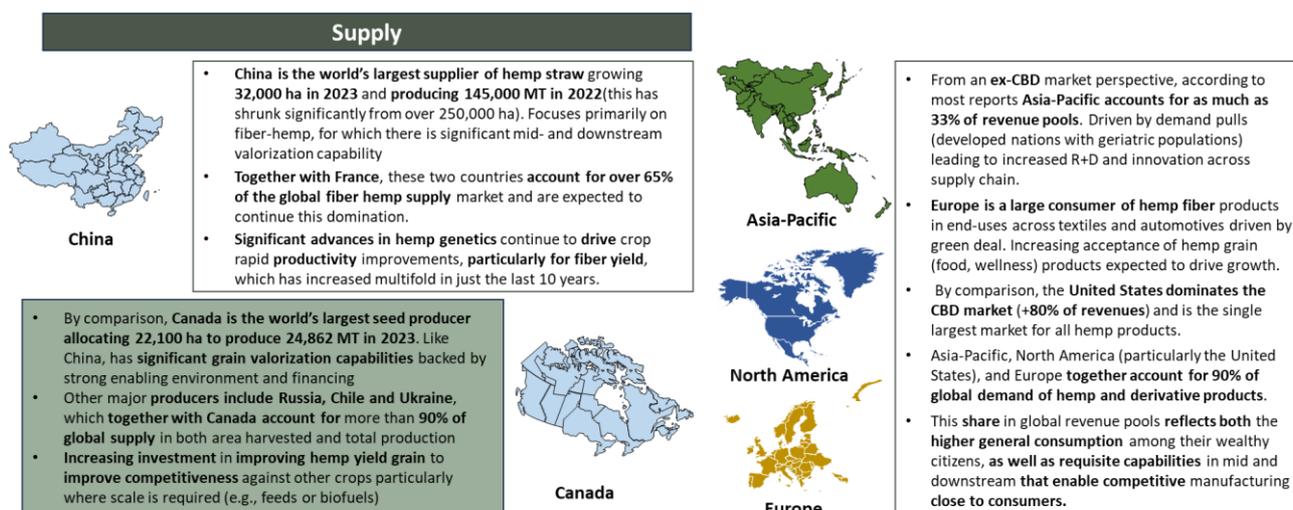


Figure 20: Key supplier and demand markets<sup>84</sup>

### III. Drivers of Industrial Hemp Demand

Global sustainability agendas, green energy policies, and corporate environmental, social, and governance (ESG) commitments form the backbone of hemp’s growing attractiveness. Hemp’s fast growth cycle and relatively minimal resource needs position it as a low-impact crop well aligned with carbon reduction efforts and circular economy objectives. Advances in cultivation techniques and

<sup>84</sup> Image source: Zageta Solutions

processing technology now facilitate value addition at multiple supply chain points, from farm gate to finished products. Crucially, regulatory progress - particularly frameworks that clearly separate industrial hemp from CBD varieties - reduces investment risks and opens international market pathways.<sup>85</sup> Consumer preferences trending toward wellness, environmental responsibility, and natural products add further impetus.

| Risks and Challenges                           |   | Opportunities                         |  |
|--|---|---------------------------------------|--|
| Regulatory and Policy Risks                    | <ul style="list-style-type: none"> <li>• <b>Stringent regulatory environment</b> on cultivation, processing, and product use increases compliance burdens.</li> <li>• <b>Confusion between hemp and cannabis</b> continues to limit access to finance, insurance, and mainstream market participation.</li> </ul>   | Expanding Market Demand               | <ul style="list-style-type: none"> <li>• <b>Global demand</b> for hemp is set to more than <b>double by 2030</b>, driven by the shift toward sustainable, plant-based industries. Its low-carbon, biodegradable nature positions hemp as a key enabler of the global green and net-zero transition.</li> </ul>   |
| Market and Competitive Pressures               | <ul style="list-style-type: none"> <li>• <b>Highly competitive market</b> due to large number of domestic and international players</li> <li>• Market volatility high as prices fluctuate because of low volumes, thin supply chains, and competition from established materials such as cotton, soy, and timber.</li> </ul>  | Innovation and Research Advancements  | <ul style="list-style-type: none"> <li>• <b>Advancing R&amp;D</b> offers opportunities to <b>improve efficiency, quality, and competitiveness</b> across all 5F+F segments, from developing sustainable materials for construction and textiles to enhancing formulations for foods, wellness, and bioplastics.</li> <li>• <b>Triple-Helix Innovation Models</b> to drive advances in hemp genetics and material applications, etc.</li> </ul> |
| Regulations, Supply + Threats to other Sectors | <ul style="list-style-type: none"> <li>• For some market players, <b>dependence on imported seeds</b> raises <b>costs and planting delays</b>.</li> <li>• <b>High capital costs</b> of critical midstream technologies (e.g., decorticators, solvent/CO<sub>2</sub> extractors, short-path distillation).</li> <li>• Evolving and <b>inconsistent global regulatory frameworks</b> create uncertainty for investors and buyers, <b>delaying market entry and discouraging long-term commitments</b>.</li> </ul> | Market Entry and Investment Potential | <ul style="list-style-type: none"> <li>• <b>Low-to-moderate capital investment requirements</b> in certain demand pathways (e.g., hemp foods, cosmetics, etc.) <b>create opportunities for new entrants and SMEs</b>.</li> <li>• <b>Diversified demand pathways</b> (Foods, Fibres, Fractions, Fuels, Formulations, and Bio-Composite) offer <b>multiple revenue streams and investment entry points</b>.</li> </ul>                           |

**Figure 21: Risks, Challenges and Opportunities<sup>86</sup>**

Transitioning from this quantitative backdrop, the next section explores the broad market dynamics and shifting demand that set the tone for global competitiveness and growth trajectory and is further supported by and integrated into the qualitative evidence base below.

### 3.1.2 KEY FINDINGS FROM GLOBAL STAKEHOLDERS

The section below explores the drivers, dynamics and ecosystem conditions that shape industrial hemp demand globally. It is critical to understand not only how large the global market currently is but also the nature of its evolution. This qualitative view complements the high-level desktop by providing a contextual basis for global trends including the nuances of regulations, investigating sourcing preferences, understanding how the industry organises itself and what is required for new entrants like South Africa to compete on the global stage. The analysis below is based on 17 in-depth interviews and 2 focus group discussions conducted with a stakeholder group representing 60 countries. These global stakeholders included breeders, farmers, manufacturers and associations who represent a diverse group from all the 5F segments and across the value chain. The findings are organised into the following six themes (1) global market dynamics and demand evolution (2) opportunities and challenges for new entrants (3) positioning South Africa in the global market (4)

<sup>85</sup> Hemp Today 2025: Hemp SWOT. Challenges and Opportunities for Hemp: 2025

<sup>86</sup> Image source: Zageta Solutions

regulatory and policy considerations (5) role of industry organising and collaborative networks (6) outlooks and strategic industry insights.

## I. Global Market Dynamics and Demand Evolution

The industrial hemp sector worldwide is on the cusp of rapid expansion, with projections indicating a compound annual growth rate exceeding 17% over the next seven years. This growth is driven by sustainability demands, shifting regulations, and innovations in materials that are broadening how hemp is used downstream, moving it from a niche commodity into mainstream industrial applications. Currently, production is concentrated in established hubs like China, North America, and France, where mature cultivation systems, integrated supply chains, and government support sustain market dominance. However, diversity is growing.

*"The crash of the CBD market caused incredible chaos in the United States...the pent-up supply of CBD started going into intoxicating products synthetic crap." (Int4, Cross-cutting)*

New suppliers in strategic regions are attracting buyers who want reliable supply chains. While demand for CBD remains strong globally, market maturity highlights the critical need to clearly separate CBD production - centred on the flower - from industrial hemp uses, which focus on stalks and grain. This separation is confirmed to be essential as the different demand pathways require distinct cultivation methods, regulatory frameworks, and quality controls (see Chapter 2). Blurring these lines can create regulatory confusion, inhibit investment, and constrain market development. Clear segmentation, prioritisations and vertical integration enable tailored strategies that align cultivation, processing, and market requirements more effectively. The crash of the CBD market in the US, driven largely by oversupply, highlights the risks of undifferentiated markets and reinforces the need for well-defined sector boundaries.

As legal and regulatory definitions evolve, consumer preferences are also changing rapidly, with natural fibres and sustainable textiles gaining traction globally, fuelled by social media trends and e-commerce platforms. Regulatory pressures such as the continued proliferation and extension of carbon border mechanisms (including an extension into a wider array of product classes) and other green trade requirements have accelerated demand for low-carbon alternatives like hemp. To capitalise on this, successful producers have aligned their hemp cultivation and processing investment choices with downstream demand and focus on regulatory clarity, traceability, and standards development. Timing is a crucial factor for new entrants, as entering the market at the right stage can offer advantages such as learning from the experiences of established players, avoiding early pitfalls and strategic positioning to meet emerging demand pathways. Emerging producers can leverage delayed entry to design more coordinated value chains and respond effectively to evolving regulations and market needs.

*"The timings never looked so good... you've got consumers wanting it, regulators wanting it. They don't necessarily know they want hemp, they know they want green, sustainable, carbon-friendly products." (Int 8, Cross-cutting)*

## II. Opportunities and Challenges for New Entrants

New entrants such as South Africa stand to benefit from growing global demand for industrial hemp, as well as favourable production conditions like competitive costs and counter-seasonal harvesting advantages.

These factors can help emerging producers carve out a niche in the evolving global supply chain. The absence of established value chains presents a dual-edged reality for new entrants. While it creates challenges related to coordination and scaling, it also offers a unique opportunity to intentionally design the sector from the ground up. It enables deliberate sequencing of development stages, more coordinated investment decisions, and the chance to build inclusive value-chains that integrate smaller farmers and diverse stakeholders from the outset. This can foster stronger, more resilient supply chains that are better aligned with market demands and social objectives, positioning emerging producers to shape the sector's future rather than simply adapting to legacy structures. However, significant hurdles remain. Global buyers increasingly demand traceable, certified products that go beyond raw

*“For a nascent sector like hemp where you don’t have a value chain, it’s an amazing opportunity because now we can really make sure from the onset that there is an integration from the beginning for also the smaller farmers.” (Int14, Downstream)*

*“The novelty of hemp means the market is moving beyond just selling a commodity, it’s about offering complete solutions that add real value from farm to finished product.” (Int15, Downstream)*

materials to include integrated value-added solutions, raising the bar for new entrants, requiring early investment in quality assurance, traceability systems, and adherence to international standards to build credibility and trust. Regulatory uncertainty, especially in emerging markets, continues to be a major challenge that can delay market entry and complicate trade, as discussed further in the regulatory section. Additionally, timing is critical.

Producers need to align their entry with phased sector development and prioritise demand pathways, as outlined in the market dynamics section, to avoid early pitfalls and position themselves strategically.

### III. Positioning South Africa in the Global Market

South Africa is widely regarded as possessing a “late starter advantage,” offering the flexibility to design a modern, competitive hemp industry due to the country’s diverse agricultural conditions, extensive arable land, industrial capabilities, and strategic position with counter-cyclical growing seasons, which give it a clear comparative advantage. Despite these strengths, the sector’s potential remains curtailed by inconsistent regulatory frameworks and the legal distinction between industrial hemp and medicinal cannabis. Such regulatory ambiguity not only deters investment but also complicates efforts to establish robust, integrated value chains

*“South Africa is an interesting case; you’ve got such a strong manufacturing base. ... you’ve got car manufacturing; ... all the paper-making companies ... you’re in a completely different league to a place like Malawi.” (FG1, Cross-cutting; Global South)*

- critical enablers of market confidence and scalability, as explored further in the regulatory and value chain discussions. Established hemp-producing regions benefit from predictable policy environments, strategic public interventions, and vertically integrated supply chains to foster investor confidence and market stability. South Africa’s strategic path forward lies in focusing on prioritised high-growth demand pathways. Regional trade frameworks and ongoing research collaborations provide additional levers to strengthen domestic industry capabilities and secure market access. Achieving this will require targeted regulatory reform, coordination across public and private stakeholders, and a phased development approach that prioritises key demand pathways while supporting inclusive participation by smaller producers. If these elements come together, South Africa can leverage its late entry to leapfrog into a globally competitive position.

#### IV. Regulatory and Policy Considerations

Clear, consistent, and credible regulations stand as the foundation for thriving industrial hemp sectors worldwide. A key regulatory priority is the clear differentiation not only between industrial hemp and psychoactive cannabis but also within industrial hemp itself. In mature markets, this internal distinction typically separates the hurd and grain components - which are widely accepted for industrial use - from the flower parts used for CBD production. As repeatedly mentioned, such nuanced differentiation helps avoid regulatory overlap, clarifies market segments, and supports tailored approaches to cultivation, processing, and quality control specific to each product category, avoiding over-regulation, confusion, and barriers to investment and innovation.

*“Certainty about regulations, that’s the most important enabler, and then the standard approach to help the development of an infant industry.” (Int 2, Global)*

Mature hemp markets typically feature regulatory frameworks that provide certainty and predictability, encouraging innovation and investment, often complemented by regulations with incentives, subsidies, and public intervention programs designed to stimulate demand and expedite the development of industrial capabilities. Such policies not only reduce market risks but also help catalyse industrial upgrading and higher-value product development, acting as critical levers for sector advancement. Political will and commitment are especially crucial when sector transitions are motivated by environmental and social objectives, such as decarbonisation and inclusive economic development, rather than just immediate financial returns. In these cases, regulatory frameworks must balance ambitious policy goals with practical considerations for market viability and investor confidence.

*“There’s a stigma against cannabis in South Africa... Policy should say: there will be no intoxicating substances derived from industrial hemp, period.” (Int 4, Global)*

More than a mere compliance mechanism, the regulatory environment functions as a strategic enabler that shapes not only sector growth but also investment attractiveness and seamless value chain integration. As industrial hemp sectors evolve globally, strengthening regulatory clarity and introducing adaptive policy frameworks is seen as pivotal to unlocking the industry’s full economic and environmental potential. Successful regulatory regimes frequently adopt collaborative governance models. These bring together government agencies, industry stakeholders, and academic institutions in a triple helix formation. These coordinated efforts across upstream research cultivates best practice and promotes innovation and product development, creating an integrated ecosystem and therefore a competitive advantage.

*“Whenever you have a transition which is not driven by costs... you need a political movement. The EU wanted people to use electrical vehicles. They gave incentives.” (Int 6, Equipment Manufacturer)*

More than a mere compliance mechanism, the regulatory environment functions as a strategic enabler that shapes not only sector growth but also investment attractiveness and seamless value chain integration. As industrial hemp sectors evolve globally, strengthening regulatory clarity and introducing adaptive policy frameworks is seen as pivotal to unlocking the industry’s full economic and environmental potential. Successful regulatory regimes frequently adopt collaborative governance models. These bring together government agencies, industry stakeholders, and academic institutions in a triple helix formation. These coordinated efforts across upstream research cultivates best practice and promotes innovation and product development, creating an integrated ecosystem and therefore a competitive advantage.

#### V. Role of Industry Organising and Collaborative Networks

In the industrial hemp sector, industry associations and collaborative networks bring diverse stakeholders together - growers, processors, manufacturers, researchers, and more - to advocate for shared interests, influence policy development, and promote coordinated industry efforts. In mature hemp markets, strong collaboration supported by clear legal frameworks transforms fragmented activities into a unified ecosystem capable of scaling effectively as best seen in France, China and Canada. A defining feature of competitive hemp sectors

*“Public authorities make links between our current ecosystem and other territorial ecosystems, they are matchmakers, which is quite essential.” (Int 3, Cross-cutting)*

is spatial clustering, where businesses operating along the value chain locate geographically 'close' to one another, important due to the sector's inherent cost sensitivities around transportation, especially between farmgate and processing facilities. Clustering supply chain actors is globally used as a mitigating cost factor, enabling shared infrastructure investments, and fostering efficient logistics, all improving overall competitiveness.

Inclusive industry organisations that represent the full range of value chain participants - from small-scale farmers to large downstream manufacturers - play a vital role in amplifying a unified voice for the sector. This inclusivity promotes market stability, attracts investment, and improves commercial pathways to ensure that the interests of diverse stakeholders are integrated. Without such cohesion, fragmentation or dominance by narrow interests brings risks of weakening the broader ecosystem and slowing sector development. Beyond advocacy, these networks act as crucial intermediaries connecting regulators, researchers, and market actors. They translate regulatory frameworks and scientific advancements into practical industry applications, stimulating demand and accelerating innovation adoption. Coordinated efforts in capacity building, best practice sharing, and market development enabled through collaboration allow the hemp sector to evolve dynamically in line with global trends.

## VI. Outlooks and Strategic Industry Insights

The outlook for the industrial hemp sector remains optimistic, driven by accelerating global decarbonisation efforts and circular economy initiatives. Hemp's natural carbon sequestration offers a compelling environmental benefit that is increasingly reflected in emerging business models incorporating carbon credits to support farmers and supply chains, thereby enhancing economic viability alongside sustainability.

*"Most of the carbon gets stored during the growth phase... these carbon credits should be invested back into the supply chain and go back to the farmer." (Int 10, Downstream)*

Technological progress in seed genetics, fibre processing, non-woven materials, and bio-based composites is propelling sector advancement, particularly in mature production hubs. While the gradual substitution of natural fibres for synthetic alternatives continues, near-term opportunities are seen in less complex applications such as insulation, textiles, construction and pulp. Conversely, more advanced, high-performance fibre markets demand significant capital investment, specialized processing, and technical expertise.

Production centres worldwide are expanding, supported by clustering benefits, closer regulatory alignment that enhance supply chain integration and competitiveness. South Africa is seen as well positioned as a potential African gateway owing to its favourable climate, extensive arable land, and counter-seasonal advantages. However, the sector must navigate risks including climate shocks, geopolitical tensions, and cautious private sector investment in an evolving market.

Stakeholders emphasize that sector growth should follow a phased development approach, starting with lower-complexity product streams to build foundational processing capacity and market credibility. Crucially, pathway prioritisation should align with local capabilities in related industries to leverage existing expertise and infrastructure to accelerate value chain development. This strategic sequencing allows emerging producers to avoid premature exposure to high-risk markets and better position themselves for gradual expansion into advanced, higher-value products as ecosystems mature.

---

### 3.1.3. GLOBAL LESSONS FOR SOUTH AFRICA'S HEMP STRATEGY

---

The Global Demand Assessment highlights the rapidly rising demand for industrial hemp driven by sustainability agendas, regulatory clarity, and the expansion of industrial applications. Countries that have put in place clear, differentiated policy and regulatory frameworks have enabled the development of distinct demand pathways for the fibre and grain markets. These drivers have enabled targeted investment, innovation, and diversified market growth. South Africa is positioned to become a leading African hemp supplier due to the country's acknowledged competitive advantages (e.g. climate, industrial base, research activities). The state needs to show a deeper commitment to the industry sending clear signals to investors by offering early stage financing and de-risking instruments, enabling sustainable and scalable industry growth.

The next section moves away from the outside-in-demand perspective to provide an inside-out viewpoint. The domestic demand assessment provides a quantitative assessment of local demand which is then substantiated by qualitative evidence from the domestic stakeholder assessment.

## 3.2. Domestic Demand Assessment

---

### 3.2.1. QUALITATIVE DEMAND ASSESSMENT

---

This component aims to provide a quantitative assessment of current domestic demand for hemp products in South Africa using existing publicly available data. Given the nascent state of the industry and regulatory constraints on hemp cultivation, this assessment faces significant data limitations that shape both the methodology and interpretation of findings. At present, the hemp industry remains too nascent to be embedded in the industrial nomenclature used for statistical measurement. South Africa's Standard Industrial Classification (SIC) system, based on the International Standard Industrial Classification (ISIC), does not disaggregate economic activity by input materials like hemp. Similarly, international trade statistics using the Harmonised System (HS) only explicitly identify three hemp products: raw or retted hemp fibres (HS530210), hemp fibre tow and waste (HS530290), and hemp yarn (HS530820). All other hemp products are aggregated within broader categories such as "other textile materials" or "products of vegetable fibres," making precise demand measurement impossible using conventional approaches. To this extent, while the aim is to provide as full a picture of the hemp market as possible, data limitations are acknowledged, and these prevent a comprehensive overview of this market. Encouragingly, UNCTAD has developed additional Harmonized System (HS) codes which will be published in 2026, with adoption by World Customs Organisation (WCO).

#### I. Methodological Approach

Given the data constraints outlined above, this research employs a **three-lens approach** to provide credible estimates of hemp demand potential:

### **Lens 1: Import Demand for Hemp Fibres and Yarn**

This lens examines import flows for the three explicitly identified hemp products as itemised in the trade data; namely, raw or retted hemp fibres; hemp fibre tow and waste; and hemp yarn. Since domestic hemp fibre production is marginal or non-existent, import demand provides the most reliable measure of actual market demand for hemp fibres and yarn. This approach assumes that when domestic supply is near zero, import demand captures the full extent of domestic demand. Although other hemp derivative products exist, the focus remains on hemp fibres and yarns for two reasons: First, these are the only explicit hemp products listed in the international trade data, which allows for an estimate of demand that is not muddled by assumptions around proportions of hemp used in product composition. Secondly, given South Africa's legislative position on the illegality of hemp cultivation, measuring only the imports of explicit hemp products such as fibre and yarn indicates the extent to which South Africa is able to process raw or relatively unprocessed hemp materials. This will be useful in understanding current capacity and the extent to which expansion may be needed to support a potential market that begins with the cultivation of the hemp plant in South Africa.

### **Lens 2: Import Demand for Substitute Fibres and Yarn**

This lens analyses import demand for substitute bast plant fibres (flax, jute, ramie) and seed plant fibres (particularly cotton) to assess potential demand for hemp products. Given the high substitutability between these fibres in textile and other applications, current demand for substitute fibres indicates market opportunities that hemp could capture with appropriate cultivation and processing capabilities.

### **Lens 3: Industry Sales Data Analysis**

In this lens, domestic sales data across retail and manufacturing industries that could potentially include hemp products are examined. The data cannot specifically disaggregate hemp product sales, however, the use of these "hemp product industries" provides a proxy for analysing potential hemp demand. This allows for us to identify industries where hemp may have possible market capture potential, assuming that the substitution of input materials for products in these industries is feasible. Industries growing faster than their sector averages represent strategic targets for hemp industry development.

## **II. Data Analysis**

The analysis draws upon two primary data sources. For import analysis, the research utilizes the BACI trade dataset<sup>87</sup>, which provides bilateral trade flows for approximately 5,000 products at the 6-digit HS level for 200 countries. For domestic sales analysis, the study uses Statistics South Africa's monthly statistical releases for retail trade sales as well as manufacturing production and sales. These releases provide industry-level data on sales values of products and services at the 3- and 4-digit SIC level. The way in which the data are utilised across each of the three analytic lenses is summarised in Figure 22.

---

<sup>87</sup> Gaulier, G., & Zignago, S. (2010). BACI: International trade database at the product-level (1994–2007) (CEPII Working Paper No. 2010-23).

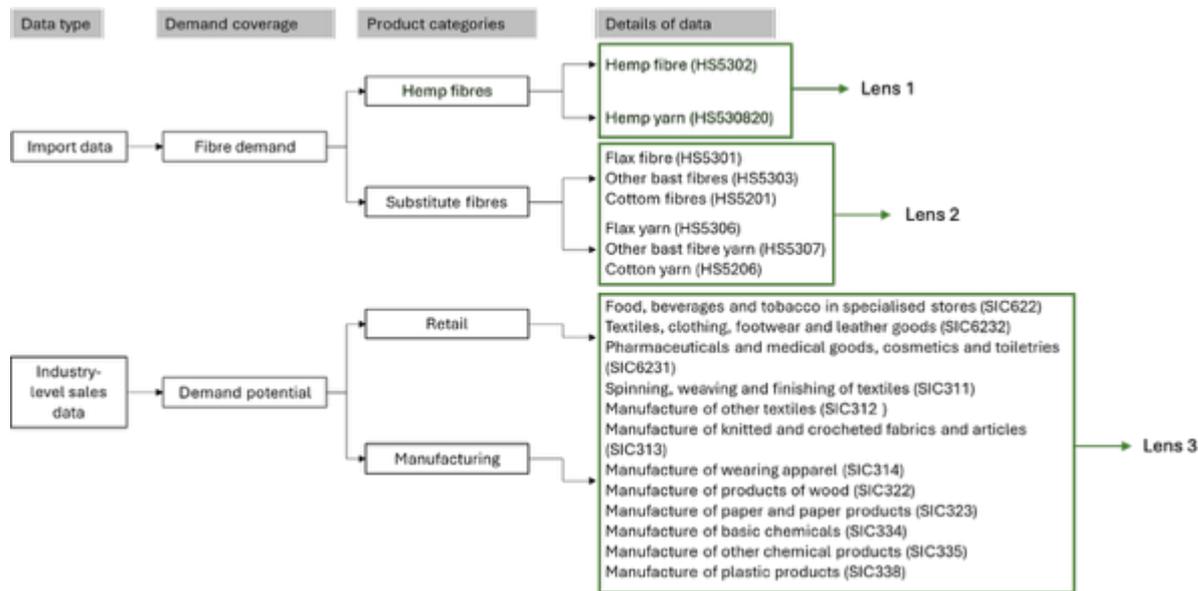


Figure 22: Summary of data used and link to analytical lenses<sup>88</sup>

Several caveats to using these data must be acknowledged. First, demand estimates from industry sales data necessarily represent upper bounds, as they assume hemp could completely displace existing materials within identified industries. This is unlikely to occur. Second, estimates may involve double counting where products from different industries require the same hemp plant inputs (e.g., both hempseed cake and animal feeds require seeds). Third, hemp yarn imports are likely underestimated in trade data because hemp-cotton yarn blends are often classified under cotton yarn imports, likely to ease customs processes.

### 3.2.2. KEY FINDINGS: TRADE DATA

#### Lenses 1 & 2: Hemp vs alternative fibres and yarns

In this section, the findings related to lenses 1 and 2 of the analysis are presented. Namely: estimates of local hemp fibre and yarn demand are presented, as well as the demand for alternative fibres and yarns of bast- or seed-fibre plants (such as cotton). As mentioned above, while other traded hemp derivative products may exist, the focus remains only on those products that are explicitly listed as hemp products in the trade data to provide an initial understanding of hemp demand in South Africa. A summary table showing import demand values, shares of fibre/yarn imports and average annual growth rates (AAGRs) between 2010 and 2023 is presented as Table 2.

<sup>88</sup> Authors' own arrangement, Gaulier & Zignago (2010), Stats SA (2025a, 2025b)

**Table 2: Imports of hemp and alternative fibres and yarns, 2010 to 2023**

|  | Import levels (USD 000s) |        |       |         | Share of total fibre/yarn imports |      |      |        | AAGR    |
|--|--------------------------|--------|-------|---------|-----------------------------------|------|------|--------|---------|
|  | 2010                     | 2016   | 2023  | Change  | 2010                              | 2016 | 2023 | Change | 2010-23 |
| <b>Fibres</b>                              |                          |        |       |         |                                   |      |      |        |         |
| Flax fibres                                | 907                      | 163    | 384   | -522    | 1,7                               | 0,6  | 3,5  | 1,8    | -5,9    |
| Hemp fibres                                | 13                       | 10     | 60    | 47      | 0,0                               | 0,0  | 0,6  | 0,5    | 11,5    |
| Jute and other textile bast fibres         | 529                      | 169    | 24    | -505    | 1,0                               | 0,7  | 0,2  | -0,8   | -19,8   |
| Ramie fibres                               | 1 790                    | 2 610  | 5 442 | 3 652   | 3,4                               | 10,2 | 50,2 | 46,9   | 8,3     |
| Cotton fibres                              | 49 830                   | 22 517 | 4 922 | -44 908 | 93,9                              | 88,4 | 45,4 | -48,5  | -15,2   |
| <b>Yarns</b>                               |                          |        |       |         |                                   |      |      |        |         |
| Yarn of flax                               | 428                      | 100    | 332   | -96     | 8,7                               | 2,2  | 4,0  | -4,7   | -1,8    |
| Yarn of jute and other textile bast fibres | 1 467                    | 517    | 494   | -973    | 29,8                              | 11,3 | 5,9  | -23,9  | -7,5    |
| Yarn of hemp                               | 8                        | 30     | 2     | -6      | 0,2                               | 0,6  | 0,0  | -0,1   | -9,4    |
| Yarns of other vegetable fibres            | 262                      | 173    | 467   | 204     | 5,3                               | 3,8  | 5,6  | 0,2    | 4,2     |
| Yarn of cotton                             | 2 755                    | 3 748  | 7 069 | 4 134   | 56,0                              | 82,1 | 84,5 | 28,5   | 7,0     |

Source: BACI HS revision 1992 (Gaulier & Zignago, 2010) Notes: 1. Fibre and yarn products restricted to those made from bast fibre plants and cotton. 2. AAGR = average annualised growth rate for the period 2010 to 2023

The analysis of explicit hemp imports reveals a small but growing market for hemp fibres, contrasted with a seemingly declining demand for hemp yarns. Note that the size of these markets is extremely small, and as a result, trends and patterns of growth may not be representative of a broader market trend for hemp products in South Africa as a whole. General results are presented here, but caution the reader is cautioned that these may not be indicative of future developments in the South African hemp market. This being said, in 2023, hemp fibre imports were valued at approximately USD 60,000 (R1 million), representing 0.6% of total fibre imports - a substantial increase from 0.02% in 2010. This represents an average annual growth rate of 11.5%, the highest among all fibre imports analysed. Import demand peaked in the late 2010s and early 2020s before declining from 2022 to 2023, though the overall trajectory remains positive.

Hemp yarn imports present a somewhat contrasting picture: Demand peaked in 2014 at approximately R860,000 but has since collapsed to just R35,000 in 2023, representing an average annual decline of 9.4%. The yarn import market is overwhelmingly dominated by cotton, which accounted for R122 million (85% of yarn imports) at its 2014 peak. While some hemp may be captured in cotton yarn statistics through cotton-hemp blends, the substantive finding remains hemp yarns face significant competitive challenges and are unlikely to capture substantial market share under current conditions.

Overall, South African clothing and textile imports - the broader category encompassing fibre and yarn imports - represented 6.63% of all imports in 2023. Within this context, hemp products remain marginal, with hemp fibres at their peak representing only 0.006% of total textile and clothing imports, and hemp yarns reaching just 0.002% at their highest point.

Substitute fibre imports highlight a trend of shifting away from cotton and towards ramie fibres, while in the yarn market, cotton retains the dominant market share. These trends reveal several strategic insights. First, the market for substitute fibres is considerably larger than for hemp. Second, the declining demand for several substitute fibres and yarns since 2010 may create market opportunities to investigate hemp as a viable substitute input in production. Third, the rapid growth of ramie fibre imports demonstrates that the South African market is receptive to alternative bast fibres when they offer competitive advantages.

### Lens 3: Identifying Growth Opportunities through Industry Sales Data

#### Retail Sector Opportunities

Between 2010 and 2024, South African retail sales grew at 1.92% per annum on average, as presented in Table 4. Potential hemp industries, highlighted in the table in green, represented a substantial and growing portion of this sector: 29.3% of retail sales in 2010, increasing to 32.2% in 2024. These hemp-related industries contributed R118 billion in growth over the period, representing 41% of all retail sales growth.

**Table 3: Value and share of retail sales by industry, 2010-2024<sup>89</sup>**

|   | Sales (Rm) |           |         | Share of sales (%) |      |      | AAGR    |
|---|------------|-----------|---------|--------------------|------|------|---------|
|   | 2010       | 2024      | Δ       | 2010               | 2024 | Δ    | 2010-24 |
| Total   | 870 547    | 1 157 368 | 286 821 |                    |      |      | 1,92    |
| General dealers   | 404 088    | 521 079   | 116 991 | 46,4               | 45,0 | -1,4 | 1,71    |
| Retailers of food, beverages and tobacco in specialised stores          | 82 307     | 89 589    | 7 282   | 9,5                | 7,7  | -1,7 | 0,57    |
| Retailers in pharmaceutical and medical goods, cosmetics and toiletries | 62 026     | 86 401    | 24 375  | 7,1                | 7,5  | 0,3  | 2,23    |
| Retailers in textiles, clothing, footwear and leather goods             | 110 578    | 197 033   | 86 455  | 12,7               | 17,0 | 4,3  | 3,93    |
| Retailers in household furniture, appliances and equipment              | 32 542     | 50 532    | 17 990  | 3,7                | 4,4  | 0,6  | 2,98    |
| Retailers in hardware, paint and glass                                  | 74 680     | 88 385    | 13 705  | 8,6                | 7,6  | -0,9 | 1,13    |
| All other retailers   | 104 328    | 124 346   | 20 018  | 12,0               | 10,7 | -1,2 | 1,18    |

Two retail industries demonstrate particularly strong demand-growth potential exceeding the sector average:

- **Pharmaceuticals and medical goods, cosmetics and toiletries (SIC6231):** Growing at 2.23% per annum, this industry reached R86.4 billion in sales by 2024. Hemp products in this

<sup>89</sup> Source: Stats SA (2025a) Notes: 1. Sales for combinations of 4- and 5-digit SIC industry groupings for the retail sector are reported. Hemp product industries shaded in green. Sales reported at constant seasonally adjusted 2019 prices.

category include face creams, balms, cosmetics, pain alleviation medicines, and wellness supplements derived from hemp oil extracts and hemp flowers.

- **Textiles, clothing, footwear and leather goods (SIC6232):** Demonstrating the strongest growth at 3.93% per annum, this industry achieved R197 billion in sales by 2024, representing 17.0% of total retail sales (up from 12.7% in 2010). This industry encompasses hemp clothing, apparel, and accessories.

## Manufacturing Sector Opportunities

Table 4 presents the values and shares of manufacturing sales by subindustry for the period 2010 to 2024. Once again, hemp industries are highlighted in green. The table further shows that the manufacturing sector grew at 0.91% per annum on average over the period 2010 to 2024.

**Table 4: Value and share of manufacturing sales by industry, 2010-2024<sup>90</sup>**

|   | Sales (Rm)       |                  |                | Share of sales (%) |              |              | AAGR         |
|---|------------------|------------------|----------------|--------------------|--------------|--------------|--------------|
|   | 2010             | 2024             | Change         | 2010               | 2024         | Change       |              |
| <b>Total manufacturing</b>                                    | <b>2 409 005</b> | <b>2 759 261</b> | <b>350 257</b> |                    |              |              | 0,91         |
| Meat, fish, fruit etc.  | 125 055          | 197 777          | 72 722         | 5,19               | 7,17         | 1,98         | 3,10         |
| Grain mill products   | 82 468           | 113 073          | 30 605         | 3,42               | 4,10         | 0,67         | 2,13         |
| Beverages   | 121 539          | 168 577          | 47 038         | 5,05               | 6,11         | 1,06         | 2,21         |
| Rest of food and beverage industry                            | 160 726          | 204 461          | 43 735         | 6,67               | 7,41         | 0,74         | 1,62         |
| <b>Food and beverages</b>                                     | <b>489 788</b>   | <b>683 888</b>   | <b>194 101</b> | <b>20,33</b>       | <b>24,79</b> | <b>4,45</b>  | <b>2,25</b>  |
| Textiles  | 9 999            | 7 525            | -2 474         | 0,42               | 0,27         | -0,14        | -1,88        |
| Other textile products  | 23 354           | 16 793           | -6 561         | 0,97               | 0,61         | -0,36        | -2,17        |
| Knitted, crocheted articles                                   | 5 489            | 2 156            | -3 332         | 0,23               | 0,08         | -0,15        | -6,04        |
| Wearing apparel   | 33 315           | 20 691           | -12 624        | 1,38               | 0,75         | -0,63        | -3,13        |
| Rest of textile and clothing industry                         | 12 690           | 12 048           | -641           | 0,53               | 0,44         | -0,09        | -0,35        |
| <b>Textiles, clothing, leather and footwear</b>               | <b>84 847</b>    | <b>59 214</b>    | <b>-25 633</b> | <b>3,52</b>        | <b>2,15</b>  | <b>-1,38</b> | <b>-2,37</b> |
| Products of wood  | 25 949           | 23 658           | -2 291         | 1,08               | 0,86         | -0,22        | -0,61        |
| Paper and paper products                                      | 93 415           | 100 294          | 6 879          | 3,88               | 3,63         | -0,24        | 0,47         |
| Rest of wood and paper industry                               | 65 172           | 54 991           | -10 181        | 2,71               | 1,99         | -0,71        | -1,13        |
| <b>Wood and wood products, paper, publishing and printing</b> | <b>184 536</b>   | <b>178 943</b>   | <b>-5 593</b>  | <b>7,66</b>        | <b>6,49</b>  | <b>-1,18</b> | <b>-0,20</b> |
| Basic chemicals   | 91 718           | 102 689          | 10 971         | 3,81               | 3,72         | -0,09        | 0,76         |
| Other chemical products                                       | 137 476          | 169 793          | 32 317         | 5,71               | 6,15         | 0,45         | 1,42         |

<sup>90</sup> Source: Stats SA (2025b) Notes: 1. Sales for combinations of 2- and 3-digit SIC industry groupings for the manufacturing sector are reported. Hemp product industries shaded in green. Sales reported at constant seasonally adjusted 2019 prices.

|  |                |                |                |              |              |              |             |
|--|----------------|----------------|----------------|--------------|--------------|--------------|-------------|
| Plastic products   | 75 037         | 80 212         | 5 175          | 3,11         | 2,91         | -0,21        | 0,45        |
| Rest of chemical industry  | 231 460        | 217 878        | -13 582        | 9,61         | 7,90         | -1,71        | -0,40       |
| <b>Petroleum, chemical products, rubber and plastic products</b>           | <b>535 691</b> | <b>570 572</b> | <b>34 881</b>  | <b>22,24</b> | <b>20,68</b> | <b>-1,56</b> | <b>0,42</b> |
| Glass and non-metallic mineral products                                    | 82 911         | 76 085         | -6 826         | 3,44         | 2,76         | -0,68        | -0,57       |
| Basic iron & steel, non-ferrous metal products, metal products & machinery | 518 899        | 573 125        | 54 226         | 21,54        | 20,77        | -0,77        | 0,66        |
| Electrical machinery   | 72 856         | 63 729         | -9 127         | 3,02         | 2,31         | -0,71        | -0,89       |
| Radio, television and communication apparatus and professional equipment   | 25 635         | 22 761         | -2 874         | 1,06         | 0,82         | -0,24        | -0,79       |
| Parts and accessories  | 100 208        | 97 996         | -2 212         | 4,16         | 3,55         | -0,61        | -0,15       |
| Rest of motor vehicles and transport equipment industry                    | 223 487        | 333 797        | 110 309        | 9,28         | 12,10        | 2,82         | 2,71        |
| <b>Motor vehicles, parts and accessories and other transport equipment</b> | <b>323 696</b> | <b>431 793</b> | <b>108 097</b> | <b>13,44</b> | <b>15,65</b> | <b>2,21</b>  | <b>1,94</b> |
| Furniture and other manufacturing division                                 | 90 147         | 99 151         | 9 004          | 3,74         | 3,59         | -0,15        | 0,64        |

Several hemp-related manufacturing industries exceeded the aggregate sectoral growth rate, presenting strategic opportunities:

- **Meat, fish, fruit, etc. (SIC301):** Growing at 3.10% per annum, reaching R197.8 billion in 2024. Relevant hemp products include hempseed cake as an animal feed supplement.
- **Grain mill products (SIC303):** Growing at 2.13% per annum, reaching R113.1 billion in 2024. This industry could incorporate hemp-based animal feeds.
- **Beverages (SIC305):** Growing at 2.21% per annum, reaching R168.6 billion in 2024. Hemp milk and other hemp-based beverages represent potential products.
- **Other chemical products (SIC335):** Growing at 1.42% per annum, reaching R169.8 billion in 2024. This industry could incorporate hemp-derived pharmaceutical and medicinal chemicals, paints, varnishes, and other industrial chemicals from hemp cellulose, lignin, and hemicellulose.

### Back-of-the-Envelope Market Sizing

Recognising the severe limitations in available data, a conservative market sizing exercise was conducted to provide order-of-magnitude estimates of hemp demand. This exercise makes a number of highly restrictive assumptions that should be kept in mind when interpreting these figures. These assumptions include:

- The 2024 baseline assumed 0.5% hemp potential, closely aligning with the 0.55% share of hemp fibers in total 2024 imports.<sup>91</sup>
- The value-added in hemp product manufacturing equals that of non-hemp products.

<sup>91</sup> Assuming that hemp demand remains proportional at 0.55% of industry demand does further assume that prevailing conditions (e.g., legislative environment making hemp cultivation illegal in South Africa) are still active. While an assumption of 0.55% of demand may be conservative, it remains representative of current hemp demand patterns based on the best available data.

- iii. The demand for all constituent parts of the hemp plant is equal and proportional.
- iv. Hemp could be used to produce all products captured within identified hemp industries.
- v. The aggregate sectoral growth rate from 2010-2024 remains constant to 2030 and 2040.
- vi. Scaled levels of hemp substitution and saturation across sectors towards 2030 (1.5%) and 2040 (3%) from increased production capabilities across the hemp value chain, related cost efficiencies, technology developments, and market demand (driven by decarbonisation compliance among other factors).

With this in mind, the report highlights that these estimates should be considered as rough upper-bound estimates of the hemp market size and caution should be taken when aggregating due to problems of double-counting and input overlap.

Under these highly restrictive assumptions, hemp market potential across retail and manufacturing could range from R7,3 billion in 2024; growing to R17.7 billion in 2030; and R40.4 billion in 2040, with the majority of this demand coming from manufactured products, including food and beverages; petroleum, chemical products, rubber and plastic products; and textile, clothing, footwear and leather goods. These figures should be interpreted as absolute upper bounds rather than realistic market projections, as they assume complete hemp substitution within industries and uniform substitution across industries - an impossibility given industry and market dynamics.

**Table 5: Back-of-the-envelope hemp potential market sizing<sup>92</sup>**

|  | 2024 Sales (Rm) | 2024 Hemp Potential @0.5% (Rm) | 2030 Sales (Rm) | 2030 Hemp Potential @1.5% (Rm) | 2040 Sales (Rm) | 2040 Hemp Potential @ 3% (Rm) |
|--|-----------------|--------------------------------|-----------------|--------------------------------|-----------------|-------------------------------|
| <b>Retail</b>  |                 |                                |                 |                                |                 |                               |
| Food, beverages and tobacco                                | 89,589          | 448                            | 92,963          | 1,390                          | 98,118          | 2,944                         |
| Pharmaceutical and medical goods, cosmetics and toiletries | 86,401          | 432                            | 98,625          | 1,479                          | 122,962         | 3,689                         |
| Textile, clothing, footwear and leather goods              | 197,033         | 985                            | 248,304         | 3,725                          | 365,085         | 10,953                        |
| <b>Manufacturing</b>                                       |                 |                                |                 |                                |                 |                               |
| Food and beverages   | 479,427         | 2,397                          | 547,901         | 8,219                          | 684,440         | 20,533                        |
| Textile, clothing, leather and footwear                    | 47,165          | 235                            | 40,843          | 613                            | 32,133          | 964                           |
| Wood and wood products, paper, publishing and printing     | 123,952         | 620                            | 122,472         | 1,837                          | 120,044         | 3,601                         |
| Petroleum, chemical products, rubber and plastic products  | 352,694         | 1,763                          | 361,676         | 5,425                          | 377,156         | 11,315                        |
| Motor vehicles, parts and accessories                      | 97,996          | 490                            | 109,970         | 1,650                          | 133,267         | 3,998                         |

<sup>92</sup> Source: Stats SA (2025a; 2025b), BACI HS revision 1992 (Gaulier & Zignago, 2010).

Note: Proportion of sales assumed to be hemp is approximated using hemp fibre import data. Hemp market potentials have been calculated by Zageeta Solutions using the sales figures provided by DPRU for total sales for only those subindustries identified as hemp industries within broader industry classifications

*“It’s a chicken and egg situation. Nobody’s planting because nobody’s buying yet and nobody’s buying because they can’t process yet.” (Int 4, Provincial hemp cluster support)*

Despite the restrictive assumptions and health warnings related to these estimates, the exercise does provide useful context: reinforcing the finding that food and beverage applications, retail pharmaceuticals, and retail textiles represent the largest absolute market opportunities, while chemical products and specific food manufacturing subsectors offer strong industrial growth trajectories.

This quantitative assessment of domestic hemp demand in South Africa reveals an industry with significant potential but facing substantial development challenges. Hemp fibre imports show encouraging growth trends, specific retail and manufacturing sectors demonstrate strong demand potential, and substitute fibre markets suggest opportunities for hemp market entry. However, the industry remains nascent, constrained by regulatory barriers and absent production infrastructure.

---

### 3.2.3 QUALITATIVE STAKEHOLDER ASSESSMENT

---

To balance the paucity of economic data for local hemp markets, it was determined that a qualitative stakeholder assessment was necessary to gain an insider-out view of potential demand as well as the policy interventions required to unlock this demand potential.

A database of the hemp industry ecosystem was developed consisting of some 250 stakeholders across roles, end-uses, and position in the value chain (5F). Stakeholders were mapped across stages of the value chain as well as in relation to prioritised demand pathways. Twenty-one in-depth semi-structured interviews were held with farmers, operators, regulators, processors, downstream manufacturers, accreditation bodies, retailers and voluntary associations. Stakeholder views are provided on market dynamics and perceptions of hemp demand pathways.

#### I. Market Dynamics

There is consensus that the hemp market is growing and that there is clear demand within key product categories. Stakeholders confirmed that food, building and construction materials, general textiles, clothing textiles, bio-composites and bioplastics, pulp and paper, and personal care products are core demand pathways for South African hemp. There was a widespread view that decarbonisation and circular economy dynamics will drive demand, but currently hemp is not sufficiently embedded in the Just Energy Transition discourse.

The positive market outlook by stakeholders was qualified by “two big ifs”. First, if outdated, contradictory legal definitions that treat hemp as a narcotic rather than an agricultural commodity are addressed. Stakeholders were of the view that it is difficult to attract investment with current legal ambiguities. Second, if the mid-stream processing infrastructure gap is addressed. Not having the technology and infrastructure machinery to beneficiate the “whole plant”, limits the business case for farmers, and limits downstream market development.

Additionally, stakeholders within the Upstream and On-farm categories highlighted poor seed availability and an overreliance on imported genetics ill-suited to local conditions. To overcome these hurdles, the sector can draw lessons from the commercialisation of wool, soybeans, and canola, which succeeded through demand-driven growth supported by enabling policies, financing mechanisms, and infrastructure investment. Smallholder farmers remain largely excluded due to limited capacity and poor institutional support, underscoring the need for targeted inclusion strategies, improved extension services, and structured market linkages to ensure broader participation in hemp industrialisation.

*“Our first pilot... fabric for garment manufacturing... represents the largest portion of our consumer base... if you can get that right, you can branch out.” (Int 13, Fashion Retailer)*

To overcome the shortfalls in the supply of biomass several downstream actors have commissioned their own pilots and cultivation projects. Stakeholders recommended that to build investor and producer confidence, a stronger evidence base is needed through trials, pilot projects, and practical demonstrations. However, the sector’s capacity for innovation is limited by a weak start-up support system and a lack of access to venture and patient capital.

## II. Stakeholder perceptions of demand pathways

There is clear acknowledgement among stakeholders that local fibre and yarn are in short supply. Farmers had clear appetite to grow hemp for fibre but highlighted the short supply and cost of specialised seed for fibre and the absence of processing hubs.

Stakeholders were upbeat about market opportunities associated with the substitution of imported synthetics and competing natural fibres with hemp yarn grown locally. There was clear indication by industry players that large retail clothing chains are looking to convert production lines away from cotton, with hemp identified as viable alternative. Obviously, dependent on price, scale and quality of supply. It was felt that the market could absorb a slightly higher price for hemp clothing and textiles, given the sustainability and decarbonisation benefits could be part of the value proposition.

|   |   |  |  |
|---|---|--|--|
| <p><i>“We’ve got a textile LOI for 15,000,000 meters of denim... so great to have the LOI, but we can’t supply the fibres locally to produce the textiles yet.” (Int 7, Midstream entrepreneur)</i></p> | <p><i>“With relatively small adaptations, they’d be able to switch over pretty quickly. The biggest thing is what’s needed on the processing side.” (Int 10, Commodity Association)</i></p> | <p><i>“Perhaps some CapEx and investment... to understand which of our product types would this be able to substitute or switch.” (Int 13, Fashion Retailer)</i></p> | <p><i>“People are more driven at the moment to see where they can substitute hemp into the traditional garment supply chains.” (Int 11 Textile Manufacturer)</i></p> |
|---|---|--|--|

With regards to health and wellness products, stakeholders were positive about demand potential but expressed frustration at the red-tape and associated compliance, regulation and lack of inter-governmental co-ordination between SAHPRA, the Department of Health, and Department of Agriculture. In this sense, demand opportunities were overshadowed by regulatory constraints associated with CBD.

*“We have got a lot of complications as it relates specifically to hemp and CBD.” (Int 15, Commodity Association)*

*“Construction Company\* is not specifically focused on building materials... it all started with building materials... but we quickly realized... to get a hemp construction materials business off the ground, you need the full supply chain.” (Int 12, Construction Company)*

There was again positive market sentiment towards the use of hemp fibre in building and construction materials, given that the demonstration of hemp as a substitute and novel sustainable input has already been established with the case of hempcrete being used to build the 14-story hotel in Cape Town.

Capturing market share

in the Food and Beverages category, is seen as one of the low-hanging fruits by stakeholders in the hemp sector. Stakeholders emphasised the nutritional benefits of hemp proteins and potential as an input ingredient to substitute, for example, palm oil. Stakeholders called for greater distinction to be made between CBD/THC derived edibles and hemp protein foodstuffs. Consumer education around the hemp-cannabis distinction is key within the FMCG-food category. There is clear appetite which can be actualised if market stigma is reduced.

*“You put [hemp] into the big oil market, and it ends up in chips or hamburgers or chickens.” (Int 10, Commodity Association)*

*“Grain is a familiar cultivation methodology in South Africa... it serves two purposes: you get biomass for low-tech applications and grain for food production.” (Int 5, Hemp Processing Entrepreneur)*

Grain mill products especially are recognised as offering significant market opportunities with low barriers to entry associated with the relatively simple processing technologies. There was clear appetite for both human and animal consumption products, but with caution expressed around animal feed use, with greater clarity needed around the treatment of hemp feed in the Farm Feeds Division under the Fertilizers, Farm Feeds, Seeds and Remedies Act 36 of 1947. Legalities notwithstanding, stakeholders shared anecdotal evidence of current hemp use in animal feeds, as a rotation option for maize.

There was also appetite with regards the fractions pathway, specifically biofuels. Stakeholders mentioned that hemp conversion to biofuel is one of the most promising options for whole plant use but comes with significant investment in R&D and production scale requirements needing strong state backing.

*“It’s not too difficult to move from cultivating hemp, farming it, to turning it into the upstream kind of feedstock or biofuel production - then you use that as a low-carbon industrial fuel for generators at mines.” (Int 8, Energy and Chemical Company)*

In conclusion, stakeholders were on the whole upbeat about the future growth trajectory of hemp, but only if regulatory constraints, fragmented coordination, and infrastructural challenges can be addressed. Stakeholders were unanimous that the state needs to play a lead role in enabling hemp industrialisation, but only if co-ordination failures across government departments, research institutions, and industry associations can be overcome. Fragmentation fosters mistrust and slows commercialisation efforts. Despite this, local entrepreneurs and small businesses are demonstrating innovation and resilience, experimenting with hemp applications across multiple sectors and products.

South Africa’s favourable climate, industrial base, and continental leadership offer strong foundations. Diverse agro-ecological zones suit various hemp varieties, and existing manufacturing can adapt to hemp inputs. Large-scale commercial readiness is evolving, but realising potential demands sustained government backing, demonstration projects, and a long-term commitment to build a mature, globally competitive industry over the course of the next decade and beyond.

### Key Takeaways from Chapter 3

Chapter 3 examines industrial hemp demand from both global and local perspectives. Globally, demand is surging, driven by sustainability goals, decarbonisation efforts, enabling regulations, and innovations across diverse markets. Rather than being perceived as a latecomer, South Africa is seen as a new entrant with unique advantages to provide reliable, standards-aligned supply, leverage strong industrial capabilities, and benefit from counter-seasonal production. This positions it well in this emerging sector.

A clear regulatory framework has enabled growth in other hemp markets, where hemp's flowering parts are regulated separately from fibre and grain. This has removed barriers and built investor confidence. Key here has been government commitment and certainty has reduced risks linked to regulatory ambiguity. Equally important has been ensuring farmers benefit economically ("Farmers must win"), is key to sustaining growth.

Beyond regulation, clear government signals are critical. Investors seek consistent, visible, and sustained commitment through strategic communication, timely policies, financing tools, and stakeholder collaboration. Without such signals, momentum stalls. Governments that back commitments with pilot projects, funding, streamlined licensing, and public-private partnerships build trust and foster innovation.

Locally, South Africa's market shows promise, especially in fibre substitutes and manufacturing sectors like textiles, construction materials, foods, and bio-composites. This is confirmed by local stakeholders. These demand pathways could stimulate rural economies but face barriers like regulatory uncertainty and limited processing infrastructure. Without clear legal frameworks, producers struggle with licensing, compliance, and market access, while limited processing capacity - specifically for fibre - restricts transforming raw materials into viable products, stifling demand and discouraging cultivation.

Given severe data limitations, a conservative market sizing exercise estimated hemp demand in South Africa at R7.3 billion in 2024. Despite restrictive assumptions, results suggest market potential could grow to R17.7 billion by 2030 and R40.4 billion by 2040 due to increased production capabilities across the hemp value chain, related cost efficiencies, technology developments, and new green market demand. Food and beverage, retail pharmaceuticals, and textiles represent the largest market opportunities, with chemical products and certain food manufacturing subsectors also showing growth potential.

Unlocking growth requires robust, supportive policies that legalise and regulate hemp clearly and target high-potential subsectors. This involves building processing facilities, developing supply chains, providing technical support, and offering incentives and financing to lower barriers for smallholders and entrepreneurs.

# Ch 4: Priority Demand Pathways

---

Chapters 1 through 3 establish a foundational evidence base regarding what hemp is, how its value chain works, and the quantum and shape of demand. Among the key takeaways from these is that the hemp sector presents a large, complex, and highly diversified character, offering multiple opportunities for stimulating investment and market activity. From a strategic standpoint, it is neither feasible nor desirable to pursue every opportunity that emerges, not least for countries such as South Africa with constrained state capabilities. As such, some level of prioritization becomes imperative and there, of course, are many ways to do this, depending on the context. In the absence of a guiding National Policy or Strategy for hemp in South Africa and limited general primary evidence base, a multi-layered and multi-disciplinary approach to prioritisation was applied. This Chapter, therefore, aims to provide some view on “where to focus”, offering a methodical process for selecting priority demand pathways that form the subject of focused industrial policy interventions (see later in Chapter 6).

The approach focuses on competitiveness and diversification as driving metrics and synthesises both a quantitative lens (based on the Frontier Product Approach, detailed further below, and Chapter 3) and qualitative lens (drawing from Chapters 1 to 3) to ensure a holistic view of all demand pathways. This view is used to rank and prioritise opportunities (based on size and growth, attractiveness, and feasibility) across different tiered “horizons” before making final recommendations on demand pathways that inform the policy enablers and recommendations. The Chapter is structured into two primary sections:

- I. **Overview of Frontier Product Approach and Results:** this section enhances the “quantitative lens” and introduces and applies a methodology for identifying and selecting a universe of hemp frontier products.
- II. **Prioritisation Approach and Results:** this section then outlines the process of synthesizing both lenses into holistic and informed recommendations on Priority Demand Pathways from the selected frontier products.

## 4.1 Diversification Pathways: Applying Economic Complexity Analysis to South Africa's Hemp Industry

---

The objective is to identify industrial demand pathways for prioritisation. To do that, the Frontier Product Approach by Hausmann et al., was used. It aims to identify industrial diversification opportunities at a country’s technological frontier. At its core, the approach combines two theories (i) economic complexity, a measure of desirable industrial diversification opportunities, and (ii) relatedness, a measure of feasible industrial diversification opportunities. During this exercise, 134 frontier products were identified and categorized into 13 groupings called “demand pathways”. The 13 demand pathways were identified through a process outlined in the first part of this chapter, which

informed the prioritisation approach described in the second part. The structure of this section reflects that sequence.

- i. Brief overview of the measures of economic complexity and relatedness, to provide a foundation for what the measures mean and how they apply
- ii. A methodological approach on the Frontier Product Approach is used to identify hemp-relevant opportunities out of many thousands
- iii. An overview of how “hemp products” are defined among a universe of many products
- iv. A review of the characteristics and capabilities of these “hemp products”
- v. An analysis of the findings and results from applying the Frontier Product Approach to filter hemp products into frontier hemp products
- vi. Finally, key takeaways in the final “long-list” of frontier hemp products, which feeds into the second part of this Chapter

---

#### 4.1.1. ECONOMIC COMPLEXITY AND RELATEDNESS

---

##### **A. Economic complexity - A measure of desirable industrial diversification opportunities**

The theory of economic complexity is based on the notion that any development of products requires not only standard factors of production, but also tacit productive knowhow on how to put all these inputs together in a business operation. This productive know-how is typically a key constraint to diversifying economic activities i.e., given its tacit nature, is not easily transferable, and tends to be spread across many individuals in a society, meaning there is a need to coordinate across teams and organisations<sup>93</sup>

A challenge faced in the application of this theory is that productive know-how is not directly measurable. The field of economic complexity uses data on the geography of economic activities to infer the presence of bundles of productive know-how. An economic complexity index is a measure of the productive know-how present within a society as expressed in the products it makes.<sup>94</sup> Using dimensionality reduction methods, the economic complexity of a country is calculated based on the diversity of its exports and their ubiquity. The most complex economies produce a diverse range of products, many of which other countries are unable to produce given the specialised nature of the productive know-how required, whereas the least complex economies produce a small range of ubiquitous products. Analogously, complex products are those that are not produced by many other countries - i.e., not ubiquitous - and, further, produced by countries with diverse export baskets - i.e., countries with many capabilities.

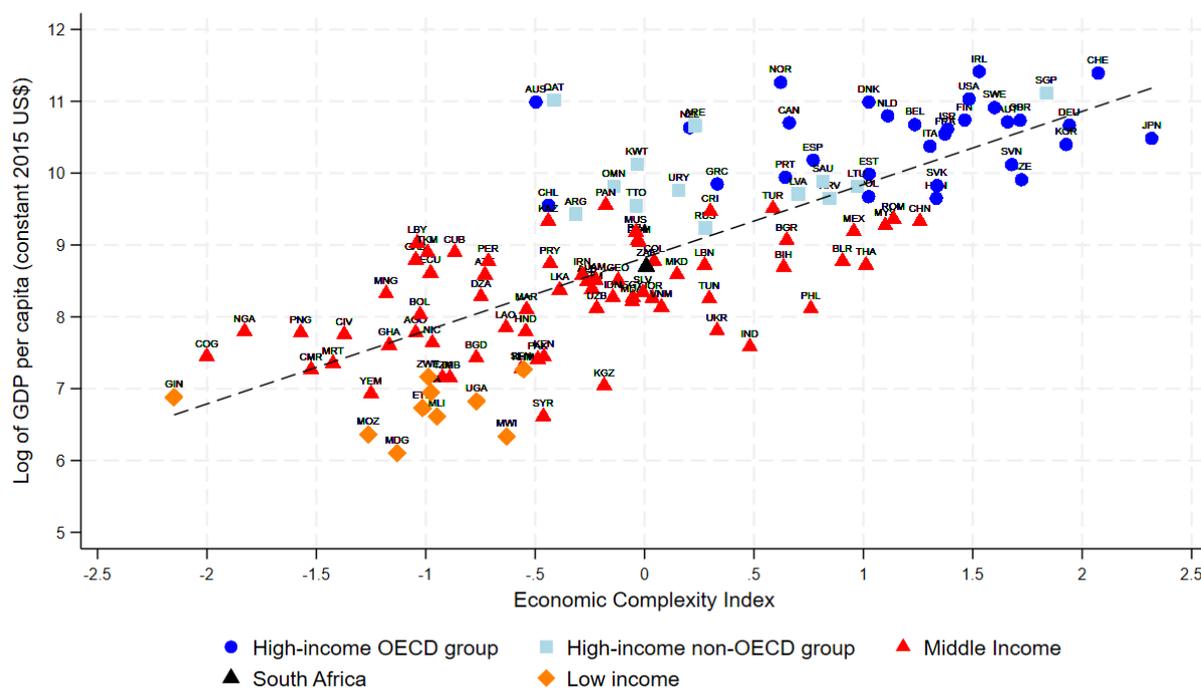
Building economic complexity is a process of accumulating productive knowhow and thereby diversifying into more complex products. This is a desirable economic development pathway i.e. it is well established in the literature that economic complexity is positively correlated with economic

---

<sup>93</sup> Hausmann, R., Hidalgo, C. A., Bustos, S., Coscia, M., Simoes, A., & Yildirim, M. A. (2014). *The atlas of economic complexity: Mapping paths to prosperity*. MIT Press.

<sup>94</sup> It is important to note that a country is classified as making a product if the country exports the product with a revealed comparative advantage (RCA). The RCA is a standard measure used in international trade analysis to determine whether a country is globally competitive in a given product. The RCA is measured as the products share of a given country's export basket divided by the products share in global trade. An RCA of unity or above indicates that a country has the requisite capabilities to manufacture a given product in a globally competitive manner.

development and predictive of future economic growth.<sup>95</sup> This relationship is illustrated in Figure 23, which **Error! Reference source not found.** plots the levels of economic development (measured using the natural logarithm of GDP per capita) and economic complexity indices for 120 low-, middle- and high-income countries. South Africa (ZAF), an middle-income country (denoted by a black triangular marker), is positioned in the middle of the space with other middle income, like, Mauritius (MAU), Vietnam (VNM), India (IND), Tunisia (TUN), and Indonesia (IDN).



**Figure 23: The relationship between economic complexity and economic development<sup>96</sup>**

Note: Correlation=0.797; p-value=0.000. Black dashed line is a line of best fit. South Africa (ZAF) is denoted by a black triangular marker.

Thus, from an industrial policy standpoint, accumulating productive know-how, and diversifying into increasingly complex products - thereby building economic complexity - is a desirable endeavour given the potentially favourable economic growth outcomes. In the frontier product approach detailed below, the product complexity index (PCI) is used to identify relatively complex products that are desirable to diversify into.<sup>97</sup>

<sup>95</sup> Hausmann, R., Hidalgo, C. A., Bustos, S., Coscia, M., Simoes, A., & Yildirim, M. A. (2014). The atlas of economic complexity: Mapping paths to prosperity. MIT Press.

<sup>96</sup> Authors' calculations using BACI trade data (Gaulier & Zignago, 2010) and World Bank (2023).

<sup>97</sup> The product complexity index (PCI) provides a relative measure of the amount of knowhow and productive capabilities needed to make a given product. The index is a relative measure in that it captures the complexity ranking of traded products in relation to one another.

## B. Relatedness - A measure of feasible industrial diversification opportunities

While building economic complexity is a desirable industrial policy objective, it is not clear which diversification opportunities represent feasible industrial pathways to follow. The relatedness literature provides the conceptual and empirical basis for determining these pathways.

Building economic complexity is contingent on accumulating the requisite productive knowhow, but this process suffers from the ‘chicken and egg’ problem<sup>98</sup>. Countries cannot create products for which they do not have the capabilities, while at the same time, they are unlikely to want to accumulate new capabilities if the production processes that demand these capabilities do not exist.<sup>99</sup>

A potential solution to this circular problem is for economies to develop new capabilities that are similar to those needed for the goods being produced within the current industrial structure, and this is where the notion of relatedness emerges. The theory of relatedness states that the success of a country entering a new product depends upon how related - in terms of productive knowhow - the product is to its current industrial structure.<sup>100</sup>

Given that capabilities are not directly observable, Hidalgo et al. (2007)<sup>101</sup> develop a proxy which infers the relatedness between two products based on the probability that the two products are both exported by a given country. The logic is as follows: where two products, such as shirts and blouses, share similar capabilities, the probability of a country exporting both goods is relatively high. However, where two products are dissimilar in the capabilities required in their production, such as shirts and jet engines, these products are unlikely to be co-exported. The probability of two goods being co-exported gives a measure of how proximate the capabilities required for producing the two products are (i.e. the relatedness between the two products).

The key relatedness metric is the distance index, which captures the distance between a product’s required capabilities and the embedded capabilities within a country’s existing productive structure. A *nearby* product requires related capabilities to those that are existing, pointing to a higher feasibility of diversification.

---

### 4.1.2. METHODOLOGY AND DATA

---

#### The Frontier Product Approach: Identifying Desirable and Feasible Industrial Diversification Opportunities

Economic complexity and relatedness metrics can be used to inform sector prioritisation in a data-centric manner and thereby provide a quantitative basis for industrial policy. Relatedness speaks to the feasibility of diversifying into a product, and economic complexity speaks to the desirability to diversify into a product. Together, these two ideas, and accompanying metrics, form the core of the *frontier product approach*, which aims to identify industrial diversification opportunities at a country’s technological frontier.

---

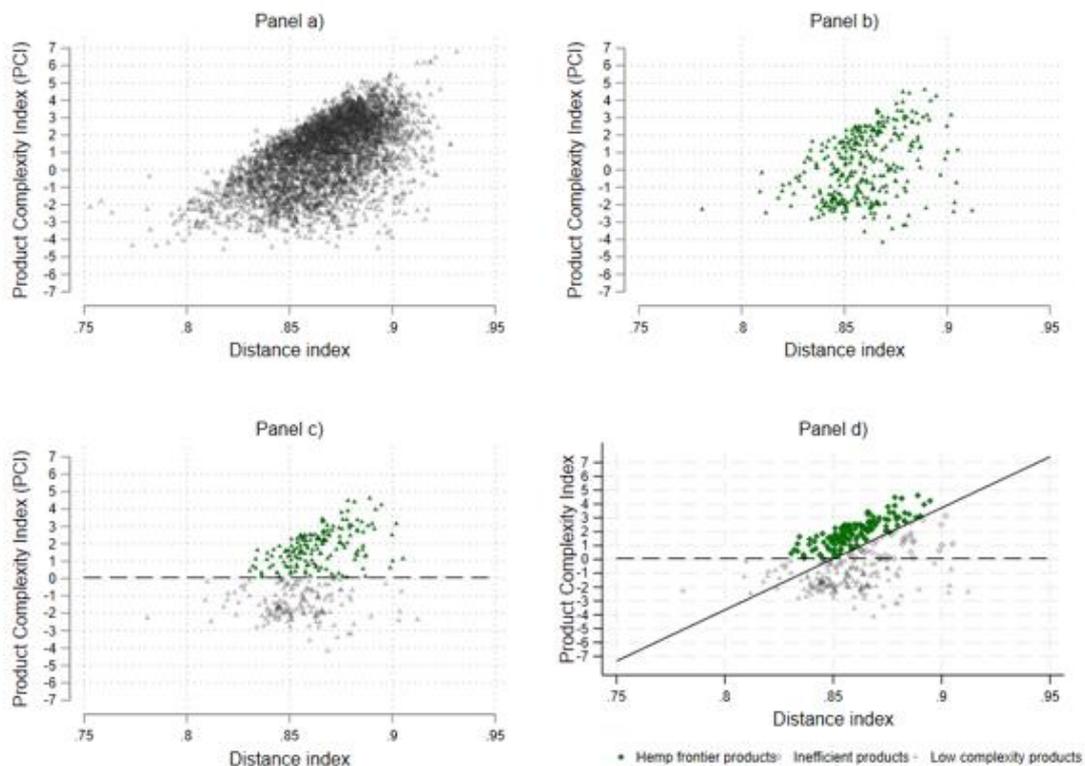
<sup>98</sup> Hausmann, R., Hidalgo, C. A., Bustos, S., Coscia, M., Simoes, A., & Yildirim, M. A. (2014). *The atlas of economic complexity: Mapping paths to prosperity*. MIT Press

<sup>99</sup> Hausmann et al., (2014).

<sup>100</sup> Hidalgo, C. A. (2021). Economic complexity theory and applications. *Nature Reviews Physics*, 3(2), 92–113.

<sup>101</sup> Hidalgo, C. A., Klinger, B., Barabási, A.-L., & Hausmann, R. (2007). The product space conditions the development of nations. *Science*, 317(5837), 482–487.

The *frontier product approach* by Hausmann and Chauvin (2015) was followed and applied to South Africa by Borat et al. (2019). The approach is depicted in **Error! Reference source not found.**Figure 24 where the sequential approach of narrowing down to a set of product-level hemp industrial diversification opportunities is presented. The universe of diversification opportunities within the product complexity (PCI)-distance space is presented. This space offers a graphical depiction of how to identify diversification opportunities that are both desirable, in terms of complexity gains (see Section 4.1.1), and feasible in terms of diversifying into nearby related products.



**Figure 24: Stages of the frontier product approach<sup>102</sup>**

The emphasis of the approach is to identify product level diversification opportunities along the hemp value chain. The universe of diversification opportunities is initially restricted to products that South Africa does not export with a revealed comparative advantage.<sup>103</sup> This is shown in panel a) starting with 3 986 products recorded at the 6-digit level of the Harmonised System trade nomenclature. With

<sup>102</sup> Source: Own calculations using BACI trade data (Gaulier & Zignago, 2010).

<sup>103</sup> This subset of products, recorded at the 6-digit level of the Harmonised System trade classification, comprises two product groupings: First, products that South Africa does not export at all. Second, products that South Africa does export but with an RCA index below unity. An RCA below unity suggests that South Africa does not have the requisite capabilities to manufacture and export in a globally competitive manner. Both groups of products represent diversification opportunities. As noted above, products with an RCA index above unity indicate that South Africa is already a globally competitive producer of the given product and thus has the requisite productive capabilities. These products do not represent diversification opportunities but rather export intensification opportunities. The frontier product approach targets diversification opportunities at the capability frontier.

the objective of advancing a process of hemp-based reindustrialisation, diversification opportunities are restricted to products along the multiproduct hemp value chain (panel b). Hemp product mappings by Broadhurst, Chimbanga & Hangone (2019), Amaral Filho et al. (2024) is then consulted and cross-referenced with hemp products identified in the analysis in Chapter 2. The products identified in panel b) represent the universe of hemp industrial diversification opportunities, and are thus a subset (379 products) of the products in panel a). The aim is to restrict the diversification opportunities to those that will build economic complexity by limiting the set of opportunities to products with a product complexity index greater than South Africa's current level of economic complexity. These represent products that satisfy the desirability criterion where the hemp product PCI is greater than South Africa's overall ECI. This is depicted by the green diamond markers above the horizontal line (representing current national economic complexity) in panel c). Ideally, one would want diversification opportunities to be both complex and related in terms of requisite productive capabilities and thus lie in the top left corner of the PCI-distance space. However, a trade-off where the more complex products are generally more distant and thus more difficult to develop is observed. To identify a set of frontier products, this trade-off is accounted for by creating a diagonal cut-off line (see panel d) that balances the objectives of higher complexity (desirability) with lower distance (feasibility).<sup>104</sup> Distant products are thus only considered if they are correspondingly complex. Put differently, the gain in complexity compensates for the substantial investment in productive capabilities needed to overcome the distance gap (i.e. worth the capability investment). These are the green diamond markers above the diagonal line in panel d). This is what is called the set of 134 frontier hemp products, which are explained further below.

---

#### 4.1.3. DEFINING HEMP PRODUCTS

---

a products mapping exercise, discussed previously, addressed the nearly 4,000 products that South Africa does not currently export with a revealed comparative advantage. The products represent an entire basket that could potentially be made of hemp as a key input material. Since not all products can be made of or with hemp, it is important to identify "hemp products" among these, defined as those that can be made with hemp as a key input material. Identification of these elements relies on the value chain mapping conducted by Broadhurst et al. (2019) and biorefinery mapping by Amaral Filho et al. (2024). The mapping is also cross-referenced with Chapter 2. Applying this mapping, identifies 379 "potential" hemp products within the initial basket of goods. An important caveat in this mapping is that except for three products explicitly coded as hemp in international trade nomenclature (hemp fibres and yarn), identified hemp products are those that *could be* manufactured using hemp as a substitute input material. The analysis captures potential hemp applications rather than current hemp-specific production.

The next section further filters the 379 potential hemp products into priority or frontier hemp products. The multi-product hemp value chain that inputs into that frontier product analysis is depicted in **Figure 25** Figure 25 below (also indicating the grouping of 379 products into 13 categories).

---

<sup>104</sup> The line is defined by connecting the two points that represent the intersection of the 25th and 75th percentiles of product complexity and distance.

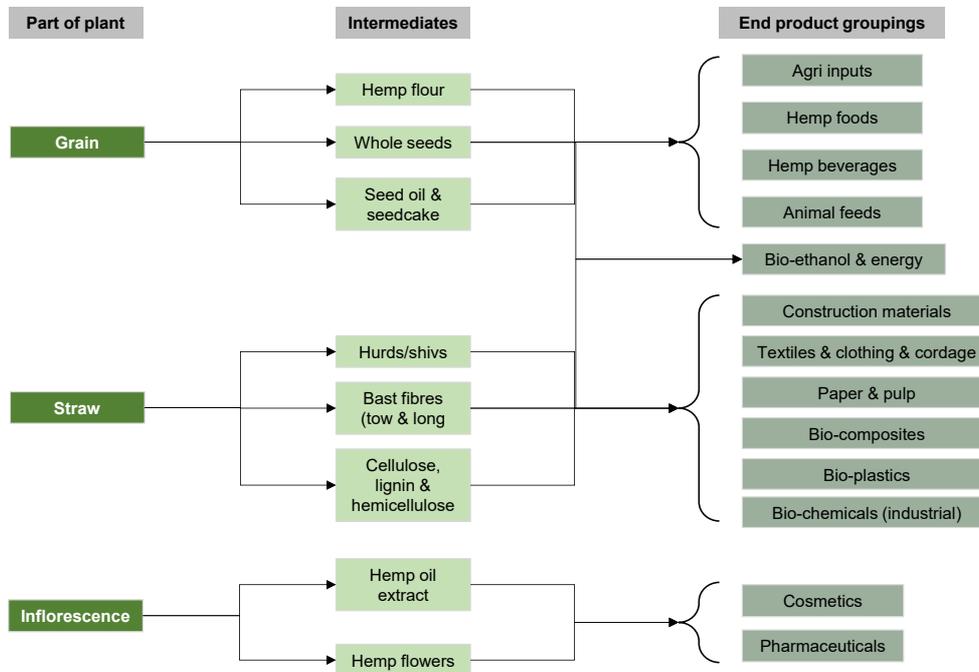


Figure 25: Multiproduct value chains for hemp products<sup>105</sup>

#### 4.1.4. HEMP PRODUCT CHARACTERISTICS AND CURRENT CAPABILITIES

##### Complexity Profile of Hemp Products

The 379 potential hemp products exhibit a distinctive bimodal complexity distribution - see **Figure 26**. The first peak occurs at a PCI of approximately -2, corresponding to footwear, headgear, textiles, and basic clothing. The second peak appears at around a PCI of 1.5, corresponding to wood products (paper, cardboard, fibreboard, particle board) and specialty chemicals (paints, varnishes, vanillin, m-xylenes).

<sup>105</sup> Image source: Zageta Solutions, 2025.

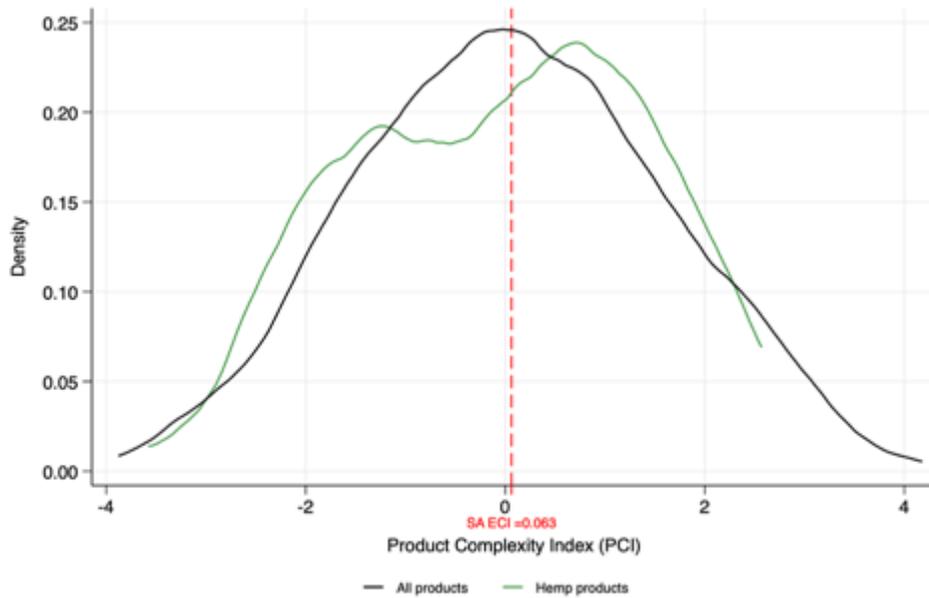


Figure 26: Distribution of PCI for hemp products in relation to all products.<sup>106</sup>

Looking at Table 6, compared to all products, hemp products are on average slightly less complex (average PCI of 0.163 versus 0.830), closer to South Africa's productive structure (distance of 0.851 versus 0.859), and more labour-intensive (capital per worker of R234,078 versus R259,917). However, important heterogeneity exists: hemp products are actually more complex than average in foodstuffs, mineral products, plastics/rubbers, and wood products.

Table 6: Hemp products versus all products, by community

|                                  | All products |              |              |                        | Hemp products |              |              |                        |
|----------------------------------|--------------|--------------|--------------|------------------------|---------------|--------------|--------------|------------------------|
|                                  | n            | PCI          | Distance     | Capital per worker (R) | n             | PCI          | Distance     | Capital per worker (R) |
| Animal and Animal products       | 190          | 0.051        | 0.838        | 244 963                | 0             |              |              |                        |
| Vegetable products               | 297          | -0.824       | 0.831        | 170 089                | 10            | -0.811       | 0.833        | 163 810                |
| Foodstuffs                       | 176          | -0.127       | 0.832        | 219 996                | 7             | 0.191        | 0.822        | 196 497                |
| Mineral products                 | 143          | -0.603       | 0.817        | 200 070                | 4             | 0.247        | 0.820        | 216 937                |
| Chemicals & allied industries    | 691          | 1.748        | 0.865        | 309 033                | 51            | 1.427        | 0.847        | 299 630                |
| Plastics/rubbers                 | 187          | 1.729        | 0.866        | 305 704                | 9             | 2.543        | 0.878        | 386 634                |
| Raw hides, skins, leather & furs | 57           | -0.911       | 0.843        | 188 085                | 0             |              |              |                        |
| Wood & wood products             | 204          | 0.888        | 0.851        | 286 790                | 131           | 1.138        | 0.851        | 299 308                |
| Textiles/clothing                | 749          | -0.886       | 0.860        | 171 059                | 142           | -1.181       | 0.851        | 154 291                |
| Footwear/headgear                | 49           | -1.194       | 0.866        | 173 600                | 15            | -1.515       | 0.879        | 153 074                |
| Stone/glass                      | 181          | 0.958        | 0.854        | 261 622                | 2             | 1.585        | 0.845        | 294 789                |
| Metals                           | 531          | 1.392        | 0.858        | 289 615                | 0             |              |              |                        |
| Machinery/electrical             | 725          | 2.062        | 0.875        | 319 595                | 0             |              |              |                        |
| Transportation                   | 128          | 1.579        | 0.861        | 284 686                | 5             | 2.428        | 0.863        | 318 333                |
| Miscellaneous                    | 348          | 1.892        | 0.879        | 287 053                | 3             | -0.704       | 0.862        | 159 074                |
| <b>All</b>                       | <b>4 656</b> | <b>0.830</b> | <b>0.859</b> | <b>259 917</b>         | <b>379</b>    | <b>0.163</b> | <b>0.851</b> | <b>234 078</b>         |

<sup>106</sup> Own calculations using BACI trade data (Gaulier & Zignago, 2010).

#### 4.1.5. FRONTIER HEMP PRODUCTS

Applying the frontier product methodology yields 134 frontier hemp products spanning 12 end-product groupings. These products have an average PCI of 1.912 (well above South Africa's ECI of 0.063), an average distance of 0.860 (indicating achievability), and an average capital per worker of R337,530. All frontier hemp products will definitively build economic complexity.

##### I. The Complexity Trade-off

Comparing frontier hemp products to all 1,774 general frontier products for South Africa reveals a trade-off: general frontier products exhibit an average PCI of 2.201, while the corresponding PCI for frontier hemp products is 1.912 (see Table 7). While hemp frontier products still grow South African complexity, by definition, hemp-specific industrial policy involves a trade-off where growing the hemp industry may require a slight complexity trade-off.

However, this average masks cross-sectoral heterogeneity, where several hemp product communities match or exceed the complexity of general frontier products:

- Plastics/rubbers: Hemp PCI 3.096 vs. general 2.422
- Mineral products: Hemp PCI 2.476 vs. general 1.173
- Transportation: Hemp PCI 2.428 vs. general 2.178
- Textiles/clothing: Hemp PCI 1.787 vs. general 1.714

These communities of products potentially suggest areas where focusing on building the hemp industry is strategically beneficial for the South African economy.

**Table 7: Frontier hemp products versus general frontier products**

|                                  | All frontier products |              |              |                        | Hemp frontier products |              |              |                        |
|----------------------------------|-----------------------|--------------|--------------|------------------------|------------------------|--------------|--------------|------------------------|
|                                  | n                     | PCI          | Distance     | Capital per worker (R) | n                      | PCI          | Distance     | Capital per worker (R) |
| Animal and Animal products       | 78                    | 1.629        | 0.856        | 350 609                | 0                      |              |              |                        |
| Vegetable products               | 64                    | 1.357        | 0.854        | 275 582                | 2                      | 0.407        | 0.855        | 228 530                |
| Foodstuffs                       | 57                    | 1.226        | 0.848        | 296 831                | 0                      |              |              |                        |
| Mineral products                 | 27                    | 1.173        | 0.852        | 279 772                | 1                      | 2.476        | 0.869        | 288 110                |
| Chemicals & allied industries    | 294                   | 2.447        | 0.870        | 357 585                | 24                     | 2.244        | 0.864        | 350 304                |
| Plastics/rubbers                 | 127                   | 2.422        | 0.867        | 343 552                | 5                      | 3.096        | 0.882        | 436 021                |
| Raw hides, skins, leather & furs | 4                     | 1.644        | 0.856        | 371 648                | 0                      |              |              |                        |
| Wood & wood products             | 114                   | 1.765        | 0.857        | 335 923                | 83                     | 1.766        | 0.858        | 336 754                |
| Textiles/clothing                | 63                    | 1.714        | 0.867        | 306 111                | 13                     | 1.787        | 0.862        | 315 907                |
| Footwear/headgear                | 0                     |              |              |                        | 0                      |              |              |                        |
| Stone/glass                      | 72                    | 1.739        | 0.863        | 300 506                | 1                      | 1.604        | 0.850        | 247 410                |
| Metals                           | 251                   | 2.097        | 0.865        | 313 821                | 0                      |              |              |                        |
| Machinery/electrical             | 398                   | 2.519        | 0.872        | 352 767                | 0                      |              |              |                        |
| Transportation                   | 67                    | 2.178        | 0.865        | 317 549                | 5                      | 2.428        | 0.863        | 318 333                |
| Miscellaneous                    | 158                   | 2.825        | 0.874        | 339 109                | 0                      |              |              |                        |
| <b>All</b>                       | <b>1 774</b>          | <b>2.201</b> | <b>0.866</b> | <b>334 243</b>         | <b>134</b>             | <b>1.912</b> | <b>0.860</b> | <b>337 530</b>         |

##### II. Frontier Products and Multiproduct Value Chain Product Categories

Examining frontier hemp products by end-product category - as per the value chain analysis - reveals strategic priorities. Product categories that show the greatest complexity gain potential are: bioplastics (average PCI = 2.992); pharmaceuticals and medicine (2.445); composites (2.428); and

industrials and biochemicals (2.289). Textiles (both clothing and non-clothing) also show a relatively high complexity gain potential. Clothing textiles, in particular, show up as relatively close to current productive structures and fairly labour-intensive as well, highlighting a potentially strong diversification option. The pulp and paper category contains the largest variety of frontier hemp products, and these are closer to South Africa's productive structure, on average, than a general hemp frontier product. While they are more capital-intensive on average, this difference is marginal and could be overcome through strategic choice of frontier product options for diversification.

**Table 8: Frontier hemp products by end-product category**

| Product category                  | n   | PCI   | Distance | Capital per worker (R) |
|-----------------------------------|-----|-------|----------|------------------------|
| Bioplastics                       | 2   | 2.992 | 0.876    | 448 021                |
| Composites                        | 5   | 2.428 | 0.863    | 318 333                |
| Construction & Building Materials | 6   | 1.268 | 0.850    | 299 673                |
| Fuels & Energy                    | 5   | 1.899 | 0.864    | 342 975                |
| Industrials & Biochemicals        | 21  | 2.289 | 0.868    | 343 670                |
| Pharmaceuticals & Medicine        | 2   | 2.445 | 0.855    | 372 176                |
| Pulp & Paper                      | 78  | 1.805 | 0.858    | 339 778                |
| Textiles                          | 13  | 1.787 | 0.862    | 315 907                |
| Wellness & Personal Care          | 2   | 1.963 | 0.850    | 328 733                |
| All                               | 134 | 1.912 | 0.860    | 337 530                |

### III. Multiproduct Hemp Value Chain Potential

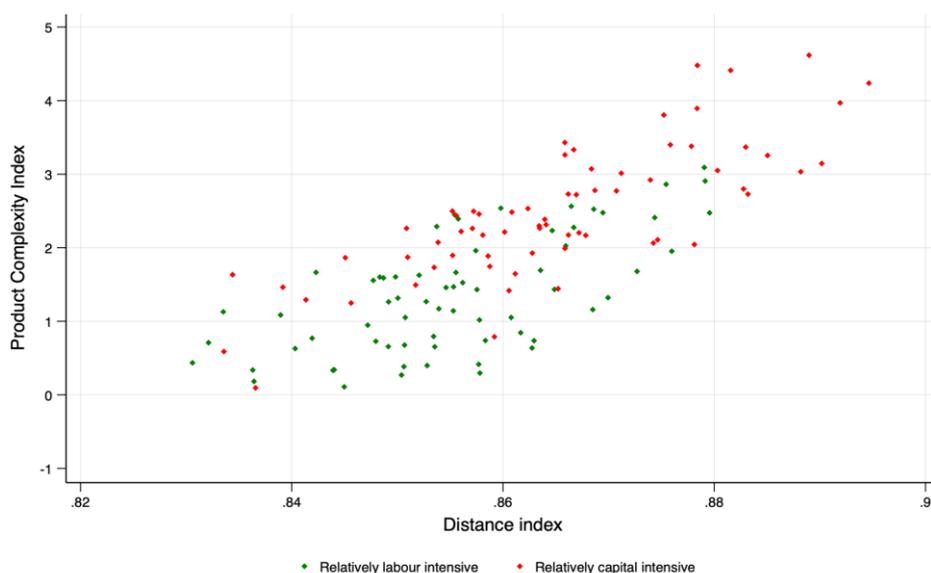
One of the key benefits of hemp is its versatility in production processes. Frontier hemp products can be divided according to the part of the plant that is used in production. Knowing how frontier hemp products divide over hemp plant inputs is useful for constructing a multiproduct value chain that efficiently uses as much of the hemp crop as possible. Hemp frontier products are distributed according to plant part as follows: Straw: 105 products (78%); Grain: 6 products (4%); Inflorescences: 2 products (1%); Residual biomass: 21 products (16%)<sup>107</sup>. Straw-based products dominate, reflecting substantial potential for fibre applications.

### IV. Labour Intensity Considerations

In South Africa, a key consideration of industrial policy is to think about labour intensity of production. This is because more labour-intensive products are likely to create jobs at a faster rate than capital-intensive products. Figure 27 shows a trade-off between labour intensity and complexity: as complexity gains increase, so products become increasingly capital-intensive to produce. Thus, perhaps it is worth targeting slightly less complex products to bolster employment creation in the hemp industry, given South Africa's employment crisis. It is, however, important to note that although

<sup>107</sup> While residual biomass is not a plant part, Amaral Filho et al. (2024) provide a list of hemp products that can be manufactured with left-over plant material after the processing for a primary product application has taken place.

more complex products are capital-intensive, they will still create jobs, just not as fast as more labour-intensive products.



**Figure 27: Frontier hemp products by labour intensity<sup>108</sup>**

---

#### 4.1.6. KEY TAKE-AWAYS ON THE FRONTIER PRODUCTS APPROACH

---

By applying the frontier product framework to hemp products 134 frontier hemp products are identified spanning across 12 end-product groupings (or demand pathways). Frontier hemp products will provide a pathway to grow South Africa’s economic complexity.

However, targeting the hemp industry specifically may come at the cost of some complexity gains relative to a broad-based targeting of general frontier products for South Africa. This is because average PCI of general frontier products is higher than the average PCI for hemp frontier products. Heterogeneity in the complexity of frontier hemp products across product categories suggests that some product communities offer greater complexity building potential than others. For example, bioplastics, pharmaceuticals and medicine, composites, and industrials and biochemicals offer the greatest complexity gain potential, but pulp and paper products offer a much larger variety of potential products to choose from while still giving strong positive complexity gains. Given the versatility of the hemp crop and the variety of feedstock it can produce, it is worth identifying frontier hemp products that can use different parts of the plant across a multiproduct value chain. Although more than half (105 of 134 frontier hemp products) require straw as the plant input, there are still sufficient alternative frontier hemp products that use alternative inputs such that the entire hemp crop can be used to build economic complexity for South Africa.

---

<sup>108</sup> Own calculations using BACI trade data (Gaulier & Zignago, 2010).

The frontier product approach provides quantitative prioritisation, but strategic hemp pathway identification requires synthesising this analysis with technical feasibility, market demand, value chain structure, and stakeholder capabilities - undertaken in previous chapters - to translate economic complexity insights into actionable industrial policy recommendations for South Africa's emerging hemp industry. The following section merges the quantitative and qualitative findings to inform the overall sector prioritisation.

## 4.2 Prioritisation of Demand Pathways

---

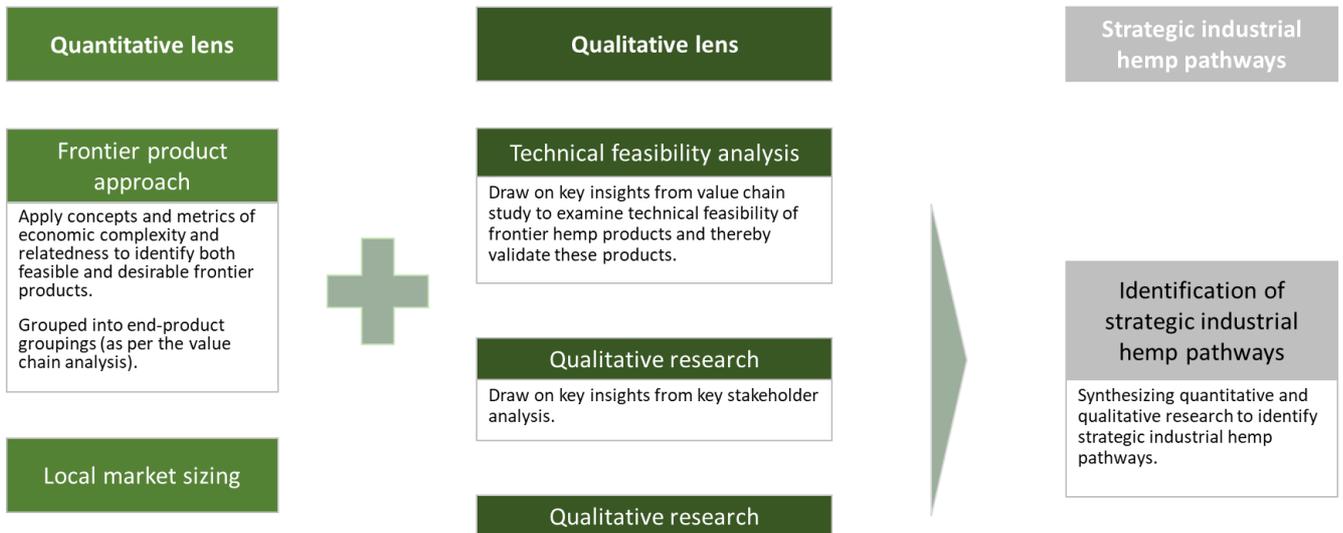
The previous sub-section identified 134 priority/frontier hemp products and their categorisation into 12 “demand pathways”, which now require some prioritisation since it is neither possible, nor desirable, for the South African state to pursue all of these.

All demand pathways (comprising 134 frontier hemp products, grouped into 12 demand pathways) identified are in effect priority opportunities. While some are near-term, others are more difficult to execute, while yet others may require greater enablement to become viable opportunities. Depending on the desire and appetite from decision-makers, the relative emphasis or attractiveness of opportunities can, of course, vary significantly, and it was not feasible (nor desirable) to model every imaginable scenario. Instead, these have been categorised into tiered opportunity sets as follows:

- **Tier 1:** pathways with highest attractiveness and ease of execution. Notwithstanding requisite industrial support, these are “closest horizon” opportunities.
- **Tier 2:** near-term horizon opportunities that require some either scale or capability to be built, or require innovation, and may become Tier 1 or 3 opportunities given learnings over time.
- **Tier 3:** lowest relative attractiveness and ease of execution opportunities. These are “further-horizon” but if late-maturing, may require earlier prioritisation.

Two caveats are important here. First, priority demand pathways may shift over time in light of market and other factors, and the tier they fall into should not be static. Indeed, through investment in learning and industrial policy interventions, some priority demand pathways that may initially appear less attractive or viable could change over time. Second, there is no publicly available national strategy for hemp. Notwithstanding the Draft National Cannabis Masterplan and the most recently published DTIC Commercialisation Policy, neither provides a clear evidence-based set of strategic choices nor explicit or implied trade-offs that would inform this study's prioritisation metrics. Indeed, the viability or attractiveness of sectors are in many instances dependent on a strategic imperative from the public sector that ensures appropriate suits of instruments are deployed to ensure, or at least maximise the changes of, their success.

Nevertheless, this study employs various lenses (informed by all Discovery findings) to inform strategic hemp demand pathways that will become the focus of targeted interventions in Chapter 5.



**Figure 28: Overall approach to identify strategic hemp pathways: synthesising qualitative and quantitative inputs <sup>109</sup>**

#### 4.2.1. QUANTITATIVE LENS

For the qualitative assessment, sets of metrics were established based on prior assessments:

| Product grouping             | Demand Pathway     | 5-F+F                | Part(s) of Plant       | Capital/Labour intensity | Product complexity index | Distance index | Quantitative manufacturing sales demand (annualised growth rate, 2010-24) | Quantitative manufacturing sales demand, level in 2024 (Rm) |
|------------------------------|--------------------|----------------------|------------------------|--------------------------|--------------------------|----------------|---|---|
| <b>Industrial products</b>   | Industrials        | Fractions            | Inflorescences + Grain | 307,116                  | 1.588                    | 0.856          | 1.42  | 20,408  |
| <b>Biofuels</b>              | Fuels              | Fuels                | Straw + Grain          | 341,004                  | 2.001                    | 0.867          | 0.76  | 102,689   |
| <b>Bioplastics</b>           | (Bio) Plastics     | Fractions            | Straw                  | 448,021                  | 2.992                    | 0.876          | 0.76  | 80,212  |
| <b>Biochemicals</b>          | (Bio) Chemicals    | Fractions            | Straw + Grain          | 335,093                  | 2.509                    | 0.872          | 1.42  | 81,631  |
| <b>Medicinal products</b>    | Medicines          | Fractions            | Inflorescences         | 372,176                  | 2.445                    | 0.855          | 1.42  | 40,816  |
| <b>Cosmetic products</b>     | Personal Care      | Fractions            | Inflorescences + Grain | 328,733                  | 1.963                    | 0.85           | 1.42  | 26,938  |
| <b>Construction products</b> | Building           | Fibers               | Straw                  | 299,673                  | 1.268                    | 0.85           | -0.61   | 23,658  |
| <b>Paper and pulp</b>        | Pulp + Paper       | Fibers and Fractions | Straw                  | 339,778                  | 1.805                    | 0.858          | 0.47  | 100,294   |
| <b>Textile</b>               | General Textiles   | Fibers               | Straw                  | 353,066                  | 2.148                    | 0.865          | -2.02   | 24,318  |
| <b>Textile (clothing)</b>    | Clothing Textiles  | Fibers               | Straw                  | 207,844                  | 0.726                    | 0.851          | -4.59   | 22,847  |
| <b>Cordage</b>               | General Textiles   | Fibers               | Straw                  | 160,444                  | 0.297                    | 0.858          | -2.17   | 16,793  |
| <b>Motor vehicle parts</b>   | Vehicle Components | Fibers               | Grain                  | 318,333                  | 2.428                    | 0.863          | -0.15   | 97,996  |

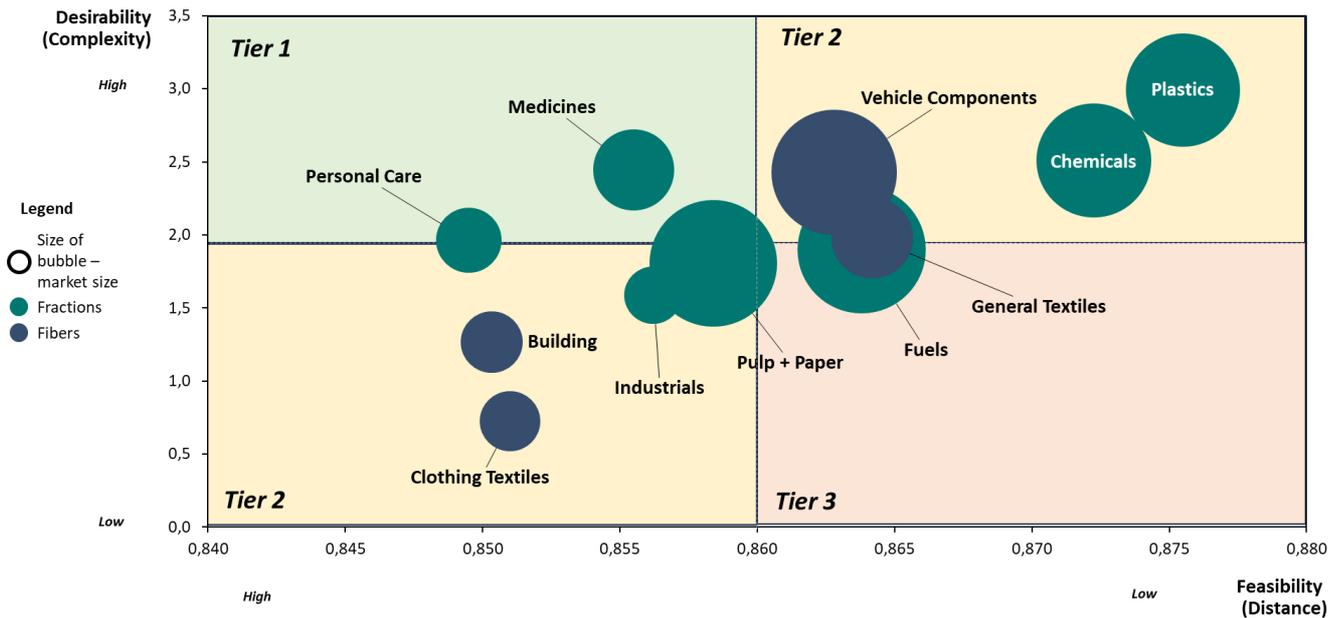
**Figure 29: Metrics for Qualitative Assessment <sup>110</sup>**

<sup>109</sup> Image source: Zageta Solutions, 2025.

<sup>110</sup> Image source: Zageta Solutions, 2025.

Using these, three proxy indices were developed to graphically represent (

**Figure 30** below) the priority landscape of all opportunities or demand pathways into the priority tiers. These indices include: (1) Desirability - based on both complexity and relative capital intensity, (2) Feasibility - based on the distance index, and (3) Market Size - based on local manufacturing demand and growth.



**Figure 30: Quantitative Lens of Priority Demand Pathways<sup>111</sup>**

This analysis yielded Demand Pathways across the priority tiers as follows:

- **Tier 1:** General Textiles; Personal Care; Pulp and Paper; Food and Beverages; Building and Construction
- **Tier 2:** Clothing Textiles; Bio-Chemicals; Bio-Plastics; Industrials
- **Tier 3:** Medicines; Bio-Fuels; Vehicle Components

Based on this lens, only Fibres and Fractions-based hemp Demand Pathways present the most desirable and feasible opportunity sets (i.e., excluding Feeds and Foods). Medicines and Personal Care, made from extracts of hemp flowers and grain, as well as many Pulp and Paper products present the nearest horizon opportunities.

<sup>111</sup> Note that the cut-off lines are based on the averages of those products for both x-axis (Distance) and y-axis (Complexity) metrics. Given that the Distance metric, when used graphically, is an “inverse” measure of feasibility— where the shorter the distance, the higher the feasibility – it means that the Tier 1 falls into the top-left (rather than top right) quadrant and Tier 3 falls into the bottom-right (rather than bottom left). The reader is guided by shaded and named quadrants to avoid confusion.

## 4.2.2. QUALITATIVE VIEW ONLY

The quantitative assessment alone does not provide a sufficiently holistic view of the attractiveness and viability of opportunities. To achieve this, the approach has been supplemented with a qualitative lens. This lens draws insights, learnings, and findings from all previous chapters and aims to provide a broader-based assessment that allows us to ground recommendations on evidence. Given that the evidence gathered provides little quantified metrics with which to compare opportunities against one another, 10 key assessment metrics that provide great robustness and richness to a perspective on each Demand Pathway were identified.

|    | Metric                       | Assessment Lines of Enquiry  |
|----|------------------------------|--|
| 1  | <b>Market</b>                | The extent to which both local and global potential addressable demand (revenues) is large and growing for hemp-derived products     |
| 2  | <b>Technical Feasibility</b> | The degree to which hemp can be used to make the suite of specific frontier (and adjacent or related) products                       |
| 3  | <b>Uptake/ Maturity</b>      | The maturity of hemp usage in demand pathway (current and future), with particular focus on R+D stage and commercialization traction |
| 4  | <b>Technology</b>            | The extent of complexity, availability, and cost of appropriate technology and related property, plant, and equipment                |
| 5  | <b>Supply + Scale</b>        | The extent of, and to which, sufficient scale, quality, consistency, and price requirements can be met with hemp.                    |
| 6  | <b>Competitiveness</b>       | The degree to which hemp frontier products or their sub-sectors are or could be (cost of other) competitive with alternatives.       |
| 7  | <b>Regulations</b>           | The degree to which regulations are clear, consistent, enforced, and generally enabling for the demand pathway generally             |
| 8  | <b>Standards</b>             | The degree to which there are existing relevant standards that assure quality, differentiate products, or ensure access to market    |
| 9  | <b>Challenges</b>            | The type, quantum, and severity of all challenges considered and degree to which these can be overcome                               |
| 10 | <b>Opportunities</b>         | The type, quantum, and holistic socio-economic and environmental impact of opportunities and degree to which these are achievable    |

**Figure 31: Metrics for Qualitative Assessment<sup>112</sup>**

Using these metrics, the assessment was applied to each of the 13 (rather than 12) identified priority Demand Pathways and rated each of these accordingly to “quantify” (i.e. score) relative outcomes. Notably, the Food + Beverages Demand Pathway was not initially prioritised among the 134 frontier products (or in the quantitative lens) since South Africa already possesses a comparative advantage (i.e., not a diversification opportunity). However, given the size of the demand and the *substitution* potential, this is included in this qualitative assessment. The Figure below provides an overview of this assessment of metrics against each Demand pathway, along with a rating (represented by a Harvey ball) translated into a score to determine rankings. Categorisation of rankings into Tiers is based on the collective team’s assessment.

<sup>112</sup> Image source: Zageta Solutions, 2025.

## Qualitative Insights on Demand Pathways

| Metric                | Demand Pathways |                           |                                    |                  |                   |   |                          |                       |                   |                           |                         |                          |
|-----------------------|-----------------|---------------------------|------------------------------------|------------------|-------------------|---|--------------------------|-----------------------|-------------------|---------------------------|-------------------------|--------------------------|
|                       | Medicines       | Personal Care (Fractions) | Building and Construction (Fibers) | General Textiles | Clothing Textiles | Vehicle Components (Fibers and Fractions) | Bio-Plastics (Fractions) | Pulp + Paper (Fibers) | Bio-Fuels (Fuels) | Bio-Chemicals (Fractions) | Industrials (Fractions) | Food + Beverages (Foods) |
| Market                | High            | Very high                 | Moderate                           | Very high        | Very high         | Moderate                                  | High                     | Moderate              | Moderate          | Very high                 | Moderate                | Very high                |
| Technical Feasibility | Very high       | Very high                 | Moderate                           | Very high        | Very high         | Very high                                 | Moderate                 | Very high             | Moderate          | Moderate                  | Moderate                | Very high                |
| Uptake + Maturity     | Very high       | Moderate                  | Moderate                           | Moderate         | Very high         | Moderate                                  | Low                      | Moderate              | Low               | Low                       | Low                     | Moderate                 |
| Technology            | High            | Moderate                  | Very high                          | Moderate         | Moderate          | Moderate                                  | Low                      | Very high             | Moderate          | Moderate                  | Low                     | Moderate                 |
| Supply + Scale        | Moderate        | Moderate                  | Moderate                           | Moderate         | Moderate          | Moderate                                  | Very high                | Very high             | Low               | Moderate                  | Low                     | Moderate                 |
| Competitiveness       | Moderate        | Moderate                  | Moderate                           | Moderate         | Low               | Low                                       | Low                      | Moderate              | Low               | Moderate                  | Moderate                | Moderate                 |
| Regulations           | None            | Moderate                  | Moderate                           | Moderate         | Moderate          | Very high                                 | Moderate                 | Very high             | Moderate          | Moderate                  | Moderate                | Moderate                 |
| Standards             | Low             | Moderate                  | Moderate                           | Moderate         | Moderate          | Low                                       | Moderate                 | Very high             | Moderate          | Moderate                  | Moderate                | Moderate                 |
| Challenges            | Low             | Moderate                  | Moderate                           | Moderate         | Moderate          | Moderate                                  | Moderate                 | Moderate              | None              | Moderate                  | Moderate                | Moderate                 |
| Opportunities         | Moderate        | Very high                 | Moderate                           | Very high        | Very high         | Moderate                                  | Moderate                 | Very high             | Moderate          | Moderate                  | Low                     | Very high                |

Key: ● Very high ● High ● Moderate ● Low ○ None

Figure 32: Summary of Ratings for Qualitative Prioritisation<sup>113</sup>

This quantitative assessment yielded Demand Pathways across the priority tiers<sup>114</sup> as follows:

- **Tier 1:** General Textiles; Personal Care; Pulp + Paper; Food + Beverages; Building + Construction
- **Tier 2:** Clothing Textiles; Bio-Chemicals; Bio-Plastics; Industrials
- **Tier 3:** Medicines; Bio-Fuels; Vehicle Components

Based on this lens, five Tier 1 opportunity Demand Pathways were identified, with the bulk of these (textiles, building & construction and pulp & paper) being fibre-based products.

### 4.2.3. A SYNTHESIZED (QUALITATIVE AND QUANTITATIVE) LENS

Qualitative and quantitative lenses are now integrated to provide a synthesised view of priority opportunity sets. This involves the use of three indices to map individual Demand Pathways to priority tiers and to provide a comparison across these. The table below provides a rationale for the index selected, as well as the metrics and method used to develop and obtain comparable figures.

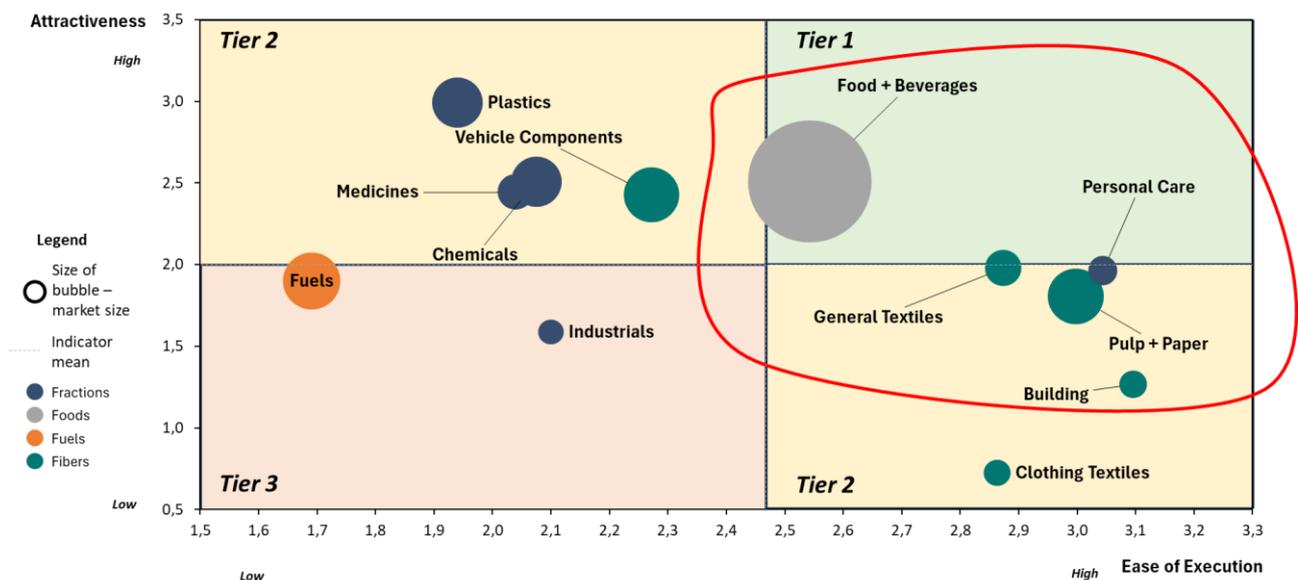
<sup>113</sup> Image source: Zageta Solutions, 2025.

<sup>114</sup> Note that the Tiers in this instance do not serve any other objective except to differentiation in rankings across the demand pathways based on their composite scores. Only the relevant scores (not the Tier they fall into) of each Demand Pathway are used in the synthesized lens, which forms the basis of the final recommendations.

**Table 9: Priority Demand Pathway Prioritisation Indices**

| Index             | Why   | What  | How   |
|-------------------|---|---|---|
| Attractiveness    | To assess relative desirability                                 | Product complexity and relative capital intensity | Index using quantitative metrics                            |
| Ease of Execution | To assess relative (holistic) feasibility or chances of success | Distance and qualitative research findings        | Index using quantitative and quantified qualitative metrics |
| Size of Market    | To assess relative size and growth prospects                    | Local manufacturing demand and growth             | Index using size and growth metrics                         |

Additionally, each of the Priority Demand Pathways is tagged by end-use type (Fractions, Fibres etc.) and mapped these across the Priority Landscape as follows:



**Figure 33: Synthesised View of Hemp Priority Demand Pathways<sup>115</sup>**

This synthesised view assessment yielded Demand Pathways across several priority Tiers. Based on this analysis, the Top 5 Demand Pathways are ranked and categorized these and others as follows :

- **Highest Priority:** General Textiles; Personal Care; Pulp and Paper; Food and Beverages; Building and Construction
- **Medium Priority:** Clothing Textiles; Bio-Chemicals; Bio-Plastics; Industrials
- **Lower Priority:** Medicines; Bio-Fuels; Vehicle Components

<sup>115</sup> Image source: Zageta Solutions

It is important to note that Demand Pathways are neither mutually exclusive nor necessarily singular. That is, it is possible for the South African state to support multiple demand pathways simultaneously, particularly where complementarities exist. For example, Food and Beverages products are made primarily from the grain part of the hemp plant, which is grown from “dual purpose” genetics that provide both straw/fibre and grain outputs. To localise the upstream supply of grain and ensure viability, local cultivation must ensure that both grain and straw parts are marketed (since the latter accounts for more than 70% of the total plant yield). However, given the lower quality of straw produced by dual purpose crops (relative to fibre-only crops), a complementary Demand Pathway for the uptake of such straw could be General Textiles (i.e. those not for clothing or apparel), where such un-retted, short fibres, find many applications.

It is also important to note these priorities are also not set in stone. Since these reflect current realities (“as-is”) rather than the results of future industrial policy interventions (“could be”), the metrics for prioritisation may change and so too, could the priority Demand Pathways chosen by South Africa policymakers. Furthermore, focusing on targeted sets of Demand Pathways does not preclude strategic opportunism. This suggests that in circumstances where a new opportunities in Lower priority Demand Pathways present with compelling attractiveness and feasibility, it would be remiss for the state to not at least explore their potential. Given that hemp is at its early innovation stages, opportunities are theoretically many and perhaps yet unknown. Such openness may identify new and niche areas of competitiveness for the South Africa hemp sector that this study has either missed or cannot yet anticipate.

A brief view of the Highest priority Demand Pathways (including Clothing Textiles) to substantiate the recommendations made is provided below.

## I. Personal Care Products

---

- **Market Context & Uptake:** Personal care products - including creams, oils, serums, and other cosmetic formulations - represent one of the most commercially advanced and globally significant hemp-derived segments. The market is large, expanding rapidly, and strongly aligned with South Africa’s existing cosmetics and fast-moving consumer goods manufacturing base. Uptake is high, with both domestic and international markets absorbing a broad range of hemp-based products.
- **Technical Feasibility & Technology Readiness:** Technical feasibility is well established. Hemp extracts and hempseed oil function as ingredients within conventional cosmetic formulations and can be integrated into existing production lines with minimal modification. Production technologies are mature, widely deployed, and well understood within the sector, resulting in low technical risk.
- **Supply, Scale & Competitiveness:** From a supply perspective, the pathway benefits from strong biomass efficiency. Oil extraction yields of approximately 10-15% from flowers and up to 350 litres of oil per hectare from grain translate into substantial output volumes relative to cultivation effort. Competitiveness is supported by the structure of the cosmetics industry, where value is driven less by raw material costs and more by formulation, branding, and differentiated active ingredients. While global CBD markets have experienced price

compression, this has primarily affected cannabinoid isolates rather than hempseed-oil-based products.

- **Regulatory & Standards Context:** Although updates under the Foodstuffs, Cosmetics and Disinfectants Act are still required, the pathway operates within established and familiar regulatory frameworks. Compliance with GMP and ISO standards is standard practice, complemented by sustainability, traceability, and provenance expectations that are already embedded in the cosmetics industry.
- **Industrialisation Opportunities for South Africa:** This pathway offers immediate industrialisation potential with low entry barriers, particularly for SMMEs. Opportunities exist to expand demand-side support models - such as CSIR technology platforms - to strengthen formulation capability, investment readiness, and market access. The segment is well suited to localisation strategies focused on value addition rather than bulk commodity production.
- **Binding Constraints & Risks:** The primary constraint lies in the utilisation of residual biomass, which can undermine overall value-chain economics if not integrated into complementary pathways. Regulatory uncertainty remains a secondary risk, particularly in relation to cannabinoid classification and compliance consistency.

## II. General Textiles

---

- **Market Context & Uptake:** General textiles represent one of the largest and fastest-growing hemp segments globally, with revenues exceeding those of clothing and apparel and expanding at nearly twice the pace. The segment includes a wide range of non-woven and technical applications - many domestically oriented and increasingly influenced by sustainability regulations and procurement standards. Uptake is already strong and continues to grow as manufacturers explore applications for short-fibre, unretted material derived from dual-purpose crops.
- **Technical Feasibility & Technology Readiness:** Technical feasibility is high. Innovation in non-wovens has advanced substantially, with proven examples of R&D and commercialisation in mature markets demonstrating technology readiness. Hemp fibre is well suited to non-woven processes, which impose lower quality thresholds than apparel-grade textiles.
- **Supply, Scale & Competitiveness:** South Africa currently lacks industrial decortication and scutching capacity, but downstream processing technologies are widely available and largely imported, with some spare capacity in related industries. Fibre yields of up to approximately 35% support moderate to strong supply potential. Competitiveness is relatively favourable compared to clothing textiles, as non-wovens face less direct competition and are less sensitive to fibre fineness and uniformity.
- **Regulatory & Standards Context:** The sector is governed by diverse regulatory and standards regimes depending on end use, including insulation, composites, and agri-textiles. While general standards exist, the absence of hemp-specific testing protocols and limited local quality-assurance capacity remain constraints.
- **Industrialisation Opportunities for South Africa:** Establishing mid-stream processing capacity would position South Africa as the first such hub in the southern hemisphere. This would create a stable outlet for straw from fibre and dual-purpose grain crops, strengthening integrated value-chain economics and supporting broader industrialisation objectives.

- **Binding Constraints & Risks:** High capital requirements, reliance on imported equipment, and fragmented standards environments pose risks. Without coordinated standards development and quality infrastructure, market access may remain constrained despite strong technical feasibility.

### III. Clothing Textiles

---

- **Market Context & Uptake:** Clothing textiles constitute a very large and expanding global market, with strong international demand. While South Africa's domestic manufacturing base has declined, local apparel demand remains high and is overwhelmingly met through imports, indicating significant import-substitution potential.
- **Technical Feasibility & Technology Readiness:** Technical feasibility is well established. Hemp fibres have a long commercial history in apparel applications, with mature production models demonstrated internationally. Local firms are already engaged in design and product development using hemp fibres, signalling downstream readiness.
- **Supply, Scale & Competitiveness:** Supply scalability is constrained. Long-fibre yields typically reach only about 25% of straw volume, and quality requirements necessitate retting, degumming, or cottonisation - all of which are capital intensive and dependent on imported technologies. South Africa faces high factor costs and intense competition from lower-cost producers, making competitiveness challenging without differentiation and scale.
- **Regulatory & Standards Context:** Regulatory and standards conditions mirror those of general textiles, with GMP and ISO frameworks in place but no hemp-specific standards. Traceability and certification requirements add further complexity.
- **Industrialisation Opportunities for South Africa:** Despite constraints, partial localisation could support employment creation, import substitution, and positioning hemp as a lower-carbon alternative to cotton and synthetics. Success would depend on targeted investment in mid-stream processing and differentiated market positioning.
- **Binding Constraints & Risks:** The absence of decortication and retting infrastructure, high capital intensity, fibre yield limitations, and global price competition represent binding constraints. Without scale and cost competitiveness, market participation remains high risk.

### IV. Pulp and Paper

---

- **Market Context & Uptake:** Pulp and paper remain among the largest global revenue segments. While traditional paper markets are cost sensitive, demand for biodegradable packaging and cellulose-based materials is growing steadily. Uptake of hemp remains moderate globally and minimal in South Africa.
- **Technical Feasibility & Technology Readiness:** Hemp has centuries-long applicability in papermaking and is technically well suited to pulp production. Technologies are mature and transferable from the forestry sector, including applications in man-made cellulosic fibres.
- **Supply, Scale & Competitiveness:** At scale, hemp can supply large volumes of cellulose-rich biomass at relatively low cost. However, low bulk density increases logistics costs, particularly in thin-margin pulp markets. Capital requirements are high and typically import dependent.

- **Regulatory & Standards Context:** Regulatory oversight falls within established environmental and forestry frameworks. Standards are well defined through SANS and industry bodies such as PAPIFSA, with no hemp-specific regulatory barriers.
- **Industrialisation Opportunities for South Africa:** Opportunities lie in whole-plant valorisation and absorbing underutilised straw biomass, improving resource efficiency and complementing forestry-based supply chains.
- **Binding Constraints & Risks:** High substitution costs for incumbent pulp producers with sunk investments, coupled with feedstock consistency risks, constrain uptake. The pathway requires long-term investment horizons.

## V. Food and Beverages

---

- **Market Context & Uptake:** Food and beverages represent one of the largest and fastest-growing hemp pathways globally and the highest-growth segment domestically. Demand is driven by shifts toward plant-based, high-nutrition products.
- **Technical Feasibility & Technology Readiness:** Technical feasibility is high. Hemp grain integrates seamlessly into existing oilseed and food-processing platforms. Commercial products - including oils, flours, proteins, and beverages - are already well established.
- **Supply, Scale & Competitiveness:** Supply is the primary constraint. Grain yields represent only 10-15% of harvested biomass, with average production of roughly one tonne per hectare. While competitiveness is strong in domestic markets, scale limitations restrict downstream expansion.
- **Regulatory & Standards Context:** The regulatory environment is highly constraining. Domestic legislation has not been updated to explicitly recognise hemp foods, and international standards remain fragmented. Regulatory volatility represents a significant risk.
- **Industrialisation Opportunities for South Africa:** The pathway is widely regarded as “low-hanging fruit,” offering inclusive opportunities for SMEs and smallholder farmers and alignment with national food-system objectives.
- **Binding Constraints & Risks:** Regulatory uncertainty, limited grain supply, and exposure to policy reversals represent the most significant risks.

## VI. Building and Construction

---

- **Market Context & Uptake:** Building and construction is among the largest global hemp-derived markets, driven by decarbonisation and energy-efficiency mandates. While domestic uptake remains limited, global shortages of hemp hurds create export opportunities.
- **Technical Feasibility & Technology Readiness:** Technical feasibility is well established. Hemp-based building materials are already commercialised internationally, with local demonstration projects confirming applicability.
- **Supply, Scale & Competitiveness:** Hemp hurds account for approximately 65% of straw, providing strong volumetric supply potential. Competitiveness is influenced by logistics and proximity to end markets, with current price premiums expected to decline with scale.

- **Regulatory & Standards Context:** The sector is governed by national building regulations and SANS standards, none of which currently recognise hemp materials. The absence of fire, structural, and performance standards remains a key barrier.
- **Industrialisation Opportunities for South Africa:** Opportunities include localisation of insulation and non-load-bearing materials, regional export markets, and integration with green building initiatives.
- **Binding Constraints & Risks:** Key risks include the absence of hemp-specific standards, lack of mid-stream processing, supply inconsistency, and reliance on imports

Overall, the findings of this chapter provide a clear and grounded basis for strategic decision making. By concentrating on pathways where South Africa can realistically build competitive advantage in the near to medium term, the country is well positioned to translate hemp's multipath potential into targeted industrial development, broader participation, and durable economic value.

#### **Key Takeaways from Chapter 4:**

The prioritisation exercise demonstrates that South Africa's hemp sector contains a diverse mix of opportunity pathways that differ markedly in market size, feasibility, and readiness. By combining quantitative indices, qualitative assessment metrics, and a synthesised analytical lens, the chapter establishes a coherent hierarchy of opportunities that recognises both immediate prospects and longer-term potential. While hemp presents a wide array of possible applications, only a subset exhibits the combined characteristics required to support near-term industrial development, including sufficient market depth, technical readiness, scalability, regulatory feasibility, and alignment with existing economic capabilities.

Across all analytical lenses, a consistent Tier 1 group emerges, comprising general textiles, personal care, pulp and paper, food and beverages, and building and construction. Although these pathways draw on different parts of the hemp plant, they share common attributes, including strong and growing demand, proven or readily adaptable technologies, and realistic prospects for localisation. Together, they represent the most compelling opportunities for early-stage industrialisation within the South African context.

The chapter further highlights the importance of an integrated approach to hemp development. The complementarities between grain-based and fibre-based pathways, as well as between food, materials, and industrial applications, indicate that multiple demand pathways can be developed concurrently where shared infrastructure, processing capabilities, and supply systems exist. This underscores the need for coordinated system-level interventions rather than fragmented, product-specific initiatives.

At the same time, the analysis confirms that prioritisation is not static. As domestic capabilities deepen, regulatory clarity improves, and market dynamics evolve, pathways currently positioned in the second or third tier may advance, while others may require renewed support to maintain momentum. The prioritisation framework should therefore be understood not as a fixed endpoint, but as a strategic, evidence-based tool to guide sequencing, investment decisions, and policy focus over time.

# Ch 5: The Financial Case for Hemp

---

The economic viability of establishing a new hemp sector is determined as much by price (if established) as by costs. From a demand perspective, the market assessments and downstream stakeholder engagements confirmed large and growing demand for hemp across all Demand Pathways, with both high potential for substitution and/or integration. That said, a recurring theme for guaranteeing downstream uptake relates to the security of a sustainable supply of farm-gate hemp in terms of scale (volumes), quality (based on end-use specifications), and price (particularly thought not exclusively for substitution purposes). Given that commercial hemp cultivation is a recently liberalised activity in South Africa, and that there is existing, credible local and international demand, a focus on understanding the viability of supply chains to meet said demand is critical. From a volume perspective, notwithstanding a lack of data on the outputs of the +1,700 permitted hemp farmers, it can be assumed that supply quantities are likely to rise over time as more than 28,000 permitted hectares are brought under production. Similarly, since there is little current activity to evaluate the quality of farm-gate outputs, it can only be assumed that with specific supplier development investments as well as general market maturity the quality is likely to improve over time.

The price of farm-gate products is among the most important factors in understanding the requirements for bridging - or finding an equilibrium between - supply and demand. On one hand, farmers are unlikely to switch to hemp if potential revenues - notwithstanding the associated costs and their ability to manage or reduce these - are low; similarly, processors are unlikely to procure farm-gate hemp at prohibitively high prices. In a new sector without a formal price-discovery mechanism, landed prices of import substitutes can serve as potential proxies for farm-gate prices. Indeed, this is the case with hemp grain and flower, which are tradable and indeed traded products across international borders. By contrast, hemp straw is characterised by low bulk density (i.e., lower volume to weight) and is therefore economically unviable to transport over large distances. This means that there is no reasonable proxy available. Furthermore, given high variability in both local agronomic conditions and management practices (which have material impacts on crop adaptation or productivity), and numerous varying input costs (e.g., machinery, seeds, fertilisers, etc.) across borders, it is crucial to build a bottom-up picture across hemp grown for various purposes.

Finally, downstream value-add is driven by demand for processed hemp fibre and grain products. As discussed in Chapter 2, different farm-gate hemp products require different capabilities to transform them into usable raw material inputs for manufacturing. Grain processing capability requirements for hemp mirror those for other grain and oilseed crops (e.g. maize, soybeans, sunflower); they are both abundant and in many cases already globally competitive. By comparison, hemp straw processing requires novel, input-specific, technologies that are not yet available in South Africa at an industrial scale. Unlike the case of hemp (fibre) cultivation in South Africa, where there are some published research and accessible stakeholders, there is little publicly available or localised data on hemp processing in South Africa outside of the CSIR's R&D work, which was closed in 2018. Nevertheless,

the extent to which theoretical straw processors in South Africa are able to operate in a manner that is economically viable, while simultaneously offering an attractive price to farmers, is an important topic of exploration, if only to provide a base and “direction of travel”, both of which will benefit from future research. This is even more important for fibres and hurds from straw, which lends hemp its unique and extensive downstream diversity.

The prioritisation exercise in Chapter 4 identified six Tier 1 Demand Pathway priorities. Of these, two (Food and Beverages and Personal Care) require input feedstock primarily from hemp grain-derived oils, and four (General Textiles, Clothing Textiles, Pulp and Paper, and Building and Construction) from either bast or hurd/shiv derived hemp straw, retted or un-retted. As discussed in Chapter 2, growing different plant parts also entails different assumptions, requirements, and costs, each of which impacts its cultivation's viability. That is, the economic viability varies depending on what it is grown for. Therefore, the primary aim of this unit economic analysis is to establish the degree to which the primary cultivation and primary processing (of hemp straw) is viable in a South African context. In so doing, the aim is to also identify and, to the extent possible, quantify the gaps, challenges, or opportunities that may be addressed by deploying sets of industrial policy tools, instruments, and other enablers to enhance and materialise the South African hemp business case.

As such, the Chapter comprises two parts core sections, and a concluding part, as follows:

- (i) **Cultivation Unit economic analysis** - detailed bottom-up cost-stack of cultivation for different purposes (e.g., fibre or grain) and under different production models (e.g., labour-intensive vs. mechanised), to understand their drivers, the returns they yield, and opportunities to optimise these.
- (ii) **Processing Unit economic analysis** - high-level returns analysis of a theoretical hemp straw primary processing plant in South Africa, to understand the potential returns, the sensitivities to various inputs, and the opportunities for optimisation.
- (iii) **Considerations and recommendation** - summary of key findings and their implications, as well as sets of considerations/recommendations related to gaps, challenges, and opportunities to inform potential policy enablers (see Chapter 6).

## 5.1. The Economics of Hemp Cultivation in SA

---

This unit economic analysis of primary cultivation aims to provide some direction with regards to its economic viability in South Africa using, to the extent possible, locally available data. Given the dearth of publicly available information (typically provided by the Department of Agriculture, the Agriculture Research Council, and other publicly funded research institutions such as the CSIR), the study has endeavoured to draw heavily from multiple and diverse sources to triangulate data and provide ranges. The primary sources of local information included permitted hemp farmers (from KZN, EC, and LP), a seed breeder and producer, a hemp seed supplier, and agricultural extension officers in the same provinces, and equipment manufacturers and distributors. Where no local data was available or unreliable (e.g., established cultivation for grain), the study has relied on established secondary literature as well as several interviews with farmers in the European Union, North America, and Latin America and adjusted findings for local contexts. Notably, there is immense variation in data provided across sources and it is impossible, without commercial techno-economic feasibility

trials over several seasons (i.e., over and above this desktop exercise) and detailed engagements with farmers,<sup>116</sup> to validate these. While this study does not purport to be a “master narrative”, it is, according to the author’s knowledge, among the first attempts to consolidate such analysis at a national level and it nevertheless provides an important lens with which to assess economic viability and to inform policy decisions.

### General Assumptions

For the analysis, costs were considered based on discrete production processes required for cultivating the two primary plant parts / farm-gate outputs desired over a single season (typically 90-160 days): hemp straw and grain. This includes production (tilling, sowing, harvesting), post-harvest handling, transportation, storage, and primary processing. At each stage of production, several important general assumptions that apply across all analysis were made.

- **Functional Unit of Analysis:** The unit of analysis is a kilogram of output (farm-gate) product.
- **Time Period:** Given that hemp is a seasonal crop, the analysis is based on a single planting (90-160 days) per year.
- **Farm-Size:** While the average permitted farm size in South Africa is roughly 16.3 ha, there is limited evidence to suggest that farmers are exercising even close to the full potential of their allocations, expected given a nascent sector. As such, the study has focused on a 1-hectare (ha) plot for the primary cultivation of fibre (for straw) and dual-purpose (for grain and straw). This plot size does not reflect economies (whether through spreading fixed costs or bulk purchase discounts) that can be obtained from working on a larger scale. Based on literature and farmer experience in other parts of the world, at least 3-5ha are required for minimum viability but this is untested in South Africa. However, to establish a common foundation, the study has focused on 1ha plots but offers a view of the impact on scale across different farming models.
- **Production Method:** At the farm-level, dryland production is assumed, due to water-scarcity in South Africa and water rights challenges, although some studies suggest higher productivity under irrigation.<sup>117</sup> This is a limitation of this study and may require future analysis given the potential, *ceteris paribus*, to improve the utilisation of many irrigation schemes across South Africa. It is unclear if previous local, publicly funded research considered the viability and impacts of cultivating under irrigation.
- **Inputs:** The analysis has assumed zero use of pesticides in line with good production practice for hemp cultivation. Further, while hemp is currently uninsurable (until the Drugs Act is formally amended), it has been assumed that this applies only to the input rather than total crop insurance.

---

<sup>116</sup> Farmer engagements on unit economics were not part of this Project’s scope but a survey was proposed to the Department of Agriculture to extract broad-based data on farmer experiences, requirements, challenges etc. At the time of writing, this remains only a recommendation. The only farmer access available to the Project team was provided by associations, extension workers, and the team’s networks.

<sup>117</sup> The Effects of Irrigation, Topping, and Interrow Spacing on the Yield and Quality of Hemp (*Cannabis sativa* L.) Fibres in Temperate Climatic Conditions: <https://www.mdpi.com/2077-0472/12/11/1923>

- **Labour vs. Mechanisation:** It is possible to cultivate hemp both manually (i.e., by hand) and mechanically (i.e., using equipment) for most stages of the production process. However, it is often impractical to undertake certain parts of the production process given the high time-consumption and labour-intensity involved, not least when wages are high and the quality of the output may be jeopardised (e.g., due to over-lignification or over-retting of straw). At smaller scales (e.g., 1ha), manual methods may prove more cost-effective but at larger scale it is likely to prove impractical and prohibitively costly. The answer may be to combine both methods (e.g., planting by hand but harvesting mechanically) and indeed this study provides such an option given that some processes are unfeasible manually (e.g., tilling and ploughing) for hemp. Finally, note that the costs and efficiencies of mechanisation can also be optimised by scale (e.g., large machinery increases efficiency and reduces time), and therefore associated costs.
- **Ownership or Rental:** Additionally, farmers can either own or rent the requisite machinery. South African commercial farmers typically own their equipment, deploying these for other crops when not needed for hemp, and in many cases have most of the necessary equipment (notwithstanding modifications) for cultivating hemp. The analysis has assumed either all the machinery is rented, or all the machinery is owned (i.e., not a combination of the two). Of course, all mechanisation will require some labour effort (whether to drive a tractor, calibrate machinery, or load inputs) and a multiplier has been applied to account for this.
- **Fixed Costs:** These include interest, depreciation, insurance and are assumed to be higher than for comparable oilseed/grain crops given licensing fees (which would be negligible at scale) and higher mechanisation requirements. Comparator/benchmark figures were sourced from the National Department of Agriculture<sup>118</sup> for the technology chosen in the analysis and compared these to maize, sunflower, and soybeans (using figures from GrainSA<sup>119</sup>).
- **Other economic factors:** For wage rates, the National Minimum Wage for agricultural labour as of September 2025 was used. An average of R20/l for the diesel (i.e., for mechanisation) price as informed by average recent figures from FuelSA has also been used.<sup>120</sup>
- **Toggles:** Two sets of cost-stacks were provided (one each for “fibre-crop” and “dual-purpose” crop). For each of those, 3 views based on a (i) labour-intensive model, and (ii) a mechanised, but fully rented model, and (iii) a mechanised, fully owned model to illustrate differences in cost structures and to understand drivers of viability have been provided.
- **Sensitivity:** General price vs. yield sensitivity tables were provided for each scenario to determine the break-even point. Additionally, a sensitivity analysis based on the biggest cost drivers and those where there is either a high likelihood of occurrence or relative feasibility to manage or reduce them is provided.

---

<sup>118</sup> National Department of Agriculture (NDA)

<sup>119</sup> <https://www.grainsa.co.za/plan-for-a-profitable-2025/2026-season>

<sup>120</sup> <https://www.petrol-price.co.za/>

## Discrete Production Processes and Inputs

### A. Land Preparation

The preparation stage involves 4 main activities to ensure the cultivation site is suitably ready for planting, namely (i) soil testing, to determine levels of fertility, moisture, acidity etc., (ii) application of lime to ameliorate soil, (iii) as necessary, removing any weeds prior to planting, and finally (iv) preparation of land to ensure an appropriate seedbed for sowing. Other than harvesting, this is the most time-consuming and effort-intensive activity in the cultivation/production process.

- 1) **Soil Testing:** assumed that multiple samples (typically 3) are taken from the plot and sent for laboratory testing (2-3 weeks) at a cost based on quotes from several South African labs. This is presumed that this is done manually, at negligible cost.
- 2) **Lime Application:** depending on the soil test results, soil may be ameliorated through the addition of lime to achieve desired pH levels in soil. This is typically done at least a month prior to preparation. The relevant application quantity is naturally variable and thus a relevant comparable cost per hectare from grain crops has been used (maize, sunflower, soybeans) using data from GrainSA and commercial hemp farmers. Note also that depending on soil conditions and types, lime may need to be applied anywhere from every year to every four; typically, farmers apply lime every second grow season. Assumptions are made for both manual labour, machinery rental, and owned machinery running costs. For mechanisation, the self-propelling, tractor-drawn SpandyCar were selected due its versatility, allowing for lime and fertiliser spreading, as well as weeding activities (and have also assumed the same machinery for these production).

**Table 10: Hemp Cultivation - Land Preparation Costs and Assumptions - Soil Amelioration**

| Land Preparation - Soil Amelioration   |               |   |
|--|---------------|---|
| Activity/Input                         | Unit /Average | Comments  |
| Materials                              |               |   |
| Lime Application (kg/ha)               | 300 - 2,000   | Less for sandier soils than for clay, depending on soil tests. Assumption: applied bi-annually. |
| Lime Cost (R/kg)                       | 0.5 - 1.5     | Depending on lime type  |
| Machinery                              |               |   |
| Machinery Hours (hrs/ha)               | 1 - 2         | Implement: SpandyCar or equivalent spreader   |
| Machinery Cost (R/hr)                  | 55 - 110      | Machinery costs (variable and fixed)  |
| Fuel Consumption (l/hr)                | 7 - 9         | Based on 4wd John Deer 6110   |
| Machinery Rental (R/ha) <sup>121</sup> | 2,400 - 5,500 | Cost of renting necessary equipment   |
| Labour                                 |               |   |
| Mechanisation Labour Multiplier        | 1.25 - 1.5    |   |

<sup>121</sup> Machinery rental costs include: tractor, fuel, implement, and driver. It excludes transportation, which can often be as much as double the rental cost on a single ha. This applies to all machinery rental figures used.

|                               |            |  |
|-------------------------------|------------|--|
| Mechanisation Labour (hrs/ha) | 1.25 - 1.5 | Machinery hours times multiplier         |
| Manual Labour (hrs/ha)        | 30 - 50    | Equivalent time required to run manually |

- 3) **Weeding:** Depending on the state of cultivation site, farmers typically need to remove any weeds/grasses prior to planting as this may impede the growth and productivity of hemp. Most farmers will apply an herbicide at a ratio and quantity relevant to type and quantity of weeds or grasses.

**Table 11: Hemp Cultivation - Land Preparation Costs and Assumptions - Weeding**

| Land Preparation - Weeding      |               |  |
|---------------------------------|---------------|--|
| Activity/Input                  | Unit /Average | Comments   |
| <b>Materials</b>                |               |  |
| Herbicide Application (l/ha)    | 0.8 - 4       | Variable depending on quantum and type of infestation. Assuming 3% herbicide solution. |
| Herbicide Cost (R/l)            | 100 - 150     | 3% Glyphosate; assuming 20l container @ R1,200-R1,400                                  |
| <b>Machinery</b>                |               |  |
| Machinery Hours (hrs/ha)        | 1 - 1.5       | Implement: SpandyCar or equivalent   |
| Machinery Cost (R/hr)           | 55 - 110      | Running costs on chosen machinery  |
| Fuel Consumption (l/hr)         | 7 - 9         | Based on 4wd John Deer 6110  |
| Machinery Rental (R/ha)         | 2,400 - 5,500 | Cost of renting necessary equipment (e.g., tractor, SpandyCar).                        |
| <b>Labour</b>                   |               |  |
| Mechanisation Labour Multiplier | 1.25 - 1.5    |  |
| Mechanisation Labour (hrs)      | 0.63 - 2.25   | Machinery hours times multiplier   |
| Manual Labour (hrs/ha)          | 90 - 140      | Equivalent time required to run manually   |

- 4) **Land preparation:** the final stage involves preparing a suitable seedbed for sowing hemp seeds. Depending on the state of land, South African farmers report requiring ploughing and multiple disking to achieve the desired outcome.

**Table 12: Hemp Cultivation - Land Preparation Costs and Assumptions - Tilling, Discing**

| Land Preparation Costs - Tilling, Discing |               |                                       |
|---|---------------|---------------------------------------|
| Activity/Input                            | Unit /Average | Comments                              |
| <b>Machinery</b>                          |               |                                       |
| Machinery Hours (hrs/ha)                  | 8 - 10        | Implement: Ripper, Disc or equivalent |

|                                 |               |                                  |
|---------------------------------|---------------|----------------------------------|
| Machinery Cost (R/hr)           | 150 - 270     | Running cost on chosen machinery |
| Machinery Rental (R/ha)         | 2,250 - 4,400 | Based on 4wd John Deer 6110      |
| Labour                          |               |                                  |
| Mechanisation Labour Multiplier | 1.25 - 1.5    |                                  |
| Mechanisation Labour (hrs)      | 7.5 - 15      | Machinery hours times multiplier |

## B. Seeding / Planting

The planting stage primarily involves the seeding of propagating materials into soil. Before then and based on the end-use application (“demand pull”), farmers select the most appropriate genetics (or may be instructed by the buyer/processor) that maximise the productivity and quality of a desired end plant-part (i.e., whether grain or straw feedstock for processing). Given variation in hemp genetics, this study has selected 3 benchmark varieties that are likely to meet demand or end-use requirements, with a bias for genetics trialled or adapted in South Africa over the last decade to adjust for local conditions. For fibre-crops, this includes Yuma-8, King Gee, and Futura 83; for dual-purpose crops, this includes NWG 2730, Fedora 17, and Orion 33. Notably, these are only used as “representative samples” to provide averages and ranges, acknowledging that performance can vary wildly depending on growing location or agronomic practice/farmer management. As such, the “expected” yields based on local farmer feedback was adjusted to arrive at the “modelled” yields. As such, the “expected yield” and the modelled “yield” vary.

Below is a table outlining the various parameters informing the analysis.

**Table 13: Sowing Density, Yield, and Price Ranges for Various Hemp Crop Varieties**

| Variety   | Sowing Density<br>kg/ha <sup>122</sup> | Biomass yield<br>kg/ha <sup>123</sup> | Grain yield<br>kg/ha | % Oil | % Fibre            | Prices<br>R/kg <sup>124</sup> |
|-----------|--|---------------------------------------|----------------------|-------|--------------------|-------------------------------|
| Yuma-S    | 85 - 110<br>(85)**                     | 10,000 - 15,000*<br>(11,000)**        | -                    | -     | 28 - 35*<br>(32)** | 150 - 190*<br>(270)**         |
| King Gee  | 80 - 100*<br>(85)**                    | 12,000 - 15,000*<br>(11,000)**        | -                    | -     | 27 - 30*<br>(29)** | 280 - 350*<br>(270)**         |
| Futura 83 | 75 - 90*                               | 9,000 - 12,000*                       | -                    | -     | 28 - 32*           | 180 - 200*                    |

<sup>122</sup> Germination rates vary due to many factors (storage, transportation, equipment used (planting, maintenance, harvesting)), adaptation potential of cultivar is 80%, as performance data for South African context is not available yet

<sup>123</sup> The data provided here is based on performance data available where cultivars adapted well and are located at a similar latitude as the identified priority growing areas

\* expected yield

\*\* modelled yield

<sup>124</sup> The prices are the current landing prices of industrial hemp in SA, including certification, shipment, import duties (including 15% VAT), excluding transport to farmer

|           |                    |                              |                           |                    |                    |                       |
|-----------|--------------------|------------------------------|---------------------------|--------------------|--------------------|-----------------------|
|           | (85)**             | (11,000)**                   |                           |                    | (30)**             | (270)**               |
|           |                    |                              |                           |                    |                    |                       |
| NWG 2730  | 50 - 75*<br>(55)** | 5,000 - 9,000*<br>(6,500)**  | 800 - 1,300*<br>(1,050)** | 28 - 32*<br>(30)** | 28 - 32*<br>(24)** | 180 - 220*<br>(270)** |
| Fedora 17 | 45 - 60*<br>(55)** | 8,000 - 10,000*<br>(8,500)** | 800 - 1,000*<br>(900)**   | 28 - 32*<br>(30)** | 28 - 32*<br>(24)** | 180 - 220*<br>(270)** |
| Orion 33  | 50 - 70*<br>(55)** | 6,000 - 8,000*<br>(6,500)**  | 800 - 1,100*<br>(950)**   | 29 - 30*<br>(30)** | 29 - 30*<br>(24)** | 180 - 220*<br>(270)** |

Direct seeding using both mechanical (planter) and manual (by hand) methods has been assumed for the study. For the former, the use of a drill planter with varying inter-row spacing to account for varying seeding densities depending on demand pathway (fibre vs dual-purpose crop) was assumed; for the latter hand spreading was assumed. Consequently, assuming the same mechanisation, it would take longer to seed for fibre-crop than dual-purpose; similarly, the manual spreading would require exponentially more time than mechanisation, not least to comply with spacing requirements that optimise plant productivity.

**Table 14: Hemp Cultivation - Planting Costs for Fibre and Dual Crop and Assumptions**

| <b>Planting</b>                 |               |               |  |  |
|---------------------------------|---------------|---------------|--|--|
| Activity/Input                  | Unit /Average |               | Comments                                   |  |
|                                 | Fibre         | Dual Crop     |  |  |
| <b>Machinery</b>                |               |               |  |  |
| Machinery Hours (hrs/ha)        | 2 - 4         | 2 - 4         | Implement: Fine seed planter or equivalent |  |
| Machinery Cost (R/hr)           | 300 - 900     | 300 - 900     | Running costs on chosen machinery          |  |
| Fuel Consumption (l/hr)         | 7 - 9         | 7 - 9         | Based on 4wd John Deer 6110                |  |
| Machinery Rental (R/ha)         | 3,600 - 6,600 | 3,600 - 6,600 | Cost of renting necessary equipment        |  |
| <b>Labour</b>                   |               |               |  |  |
| Mechanisation Labour Multiplier | 1.25 - 1.5    | 1.25 - 1.5    | Machinery hours times multiplier           |  |
| Mechanisation Labour (hrs)      | 2.5 - 6       | 2.5 - 6       |  |  |
| Manual Labour (hrs/ha)          | 160 - 250     | 140 - 220     | Equivalent time required to run manually   |  |

### C. Fertigation

Fertilisation requirements should ordinarily be informed by soil tests during preparation stage to determine appropriate applications levels. Hemp literature provides ranges of optimal nitrogen, phosphorus, and potassium, with nitrogen being the most important among these.<sup>125</sup> The stage at which farmers apply fertiliser varies (e.g. before planting; after first emergence etc.) given nutrient

<sup>125</sup> N., Brym, Z., Monserrate Oyola, L.A., Sharma, L.K., 2023. Nitrogen fertilization impact on hemp (*Cannabis sativa* L.) crop production: A review- *Agronomy Journal*, Volume 115, Issue 4 pp. 1557-1570

uptake by the plant at different growth phases, but it is an important discrete step in the production process. Farmers report applying part of the fertiliser requirement at planting stage, with top dressing after emergence. Here it is assumed this is done as a single discrete process.

For the analysis, dry fertilisers - urea (Nitrogen), DAP (Phosphorus), and potassium chloride (Potassium) - at recommended rates based on both literature and SA farmer validations from the most recent growing seasons in South Africa was assumed. Typically, fertilisers are marketed at variable NPK ratios (e.g. 2:3:2; 3:2:2), but costs and applications are provided separately for each fertiliser, highlighting minor differences between applications depending on desired plant part.

**Table 15: Hemp Cultivation - Input costs Fertigation**

| Input / Activity | Application (kg/ha) |           | Cost per Unit (R/kg) | Comments                |
|------------------|---------------------|-----------|----------------------|-------------------------|
|                  | Fibre               | Dual Crop |                      |                         |
| Nitrogen         | 155 - 180           | 145 - 170 | 12.5 - 14            | Urea prices per kg base |
| Phosphorus       | 40 - 50             | 35 - 42   | 17 - 19              | P2O5 prices per kg base |
| Potassium        | 82 - 90             | 40 - 46   | 9.4 - 11             | K2O prices per kg base  |

It has been assumed that fertiliser is applied using a mechanical spreader, both for efficiency and even distribution. The associated running and rental cost assumptions are included below. This activity can also be done manually.

**Table 16: Hemp Cultivation - Fertiliser Application Costs**

| Fertiliser Application          |               |  |
|---------------------------------|---------------|--|
| Activity/Input                  | Unit /Average | Comments   |
| Machinery                       |               |  |
| Machinery Hours (hrs/ha)        | 0.5 - 1       | Implement: SpandyCar or fertiliser                           |
| Machinery Cost (R/hr)           | 55 - 110      | Running costs on chosen machinery                            |
| Fuel Consumption (l/hr)         | 7 - 9         | Based on 4wd John Deer 6110                                  |
| Machinery Rental (R/ha)         | 2,400 - 5,500 | Cost of renting necessary equipment (e.g., tractor, sprayer) |
| Labour                          |               |  |
| Mechanisation Labour Multiplier | 1.25 - 1.5    |  |
| Mechanisation Labour (hrs)      | 0.63 - 2.25   | Machinery hours times multiplier                             |
| Manual Labour (hrs/ha)          | 25 - 50       | Equivalent time required to run manually                     |

## D. Harvesting

Harvesting requirements differ slightly between dual-purpose and fibre-only crops. Fibre-only crops mature faster than dual-purpose crops and are harvested prior to flowering. At maturity, harvesting is typically done mechanically, using mowers (a method also reported by South African farmers on trial

or smaller commercial plots). Farmers may run two passes for straw biomass; first the mower and then a swather/windrower to uniformly arrange the mowed straw. While there are examples of more hemp-specific harvesting technology (e.g. KP4-Hemp Harvester<sup>126</sup> and Crete<sup>127</sup> for simultaneous mowing (at adjustable height intervals) and swathing, these are less mature and typically very expensive (~R 2 million) and are therefore excluded from the analysis. Manual harvesting is an alternative option to mechanical, largely using machetes or equivalent, however this is an extremely time-consuming and labour-intensive exercise, not least given the harvested volumes and the level of effort to mow highly dense biomass. After harvesting, straw from fibre crops is typically left to dry to a desirable moisture (13-16%) and to ret (typically in the field, called “dew retting”) over several weeks (from 2 to 8 weeks, dependent on local agro-climatic conditions).

Dual-purpose crops yield both grain and straw biomass, each of which requires different harvesting methods. First, the grain must be removed, and the study assumes a combine harvester (with grain cart for collection) is used to collect and thresh, much like those used for other grain/oilseed crops grown at scale in South Africa (e.g. maize, soy, sunflower). It is assumed that the grain is mechanically harvested. The straw is simultaneously mowed similarly (mechanically) to straw from fibre-crop and left to dry to desirable moisture but not to ret. Notably, however, straw from dual-purpose crops has higher lignin content making the harvesting level of effort much higher than that for fibre-only straw, even the biomass yields are 30-50% lower.

The harvesting assumptions (mechanical) for both fibre and dual-purpose crops are presented below. Notably, limited local data on South African conditions necessitated a reliance on research literature and engagements with international hemp farmers. Manual harvesting is an extremely time-consuming exercise, and while it may provide seasonal employment opportunities, its practicality at scale is questionable.

**Table 17: Hemp Cultivation - Harvesting Costs for Fibre and Dual Crop**

| <b>Harvesting Assumption</b> |               |               |   |
|------------------------------|---------------|---------------|---|
| Activity/Input               | Unit /Average |               | Comments  |
|                              | Fibre         | Dual Crop     |   |
| <b>Machinery</b>             |               |               |   |
| Machinery Hours (hrs/ha)     | 4 - 8         | 4 - 8         | Implement Fibre: cutting (mower), windrowing (swather) or equivalent. |
| Machinery Cost (R/hr)        | 160 - 240     | 330 - 440     | Running costs on chosen machinery                                     |
| Fuel Consumption (l/hr)      | 7 - 9         | 7 - 9         | Based on 4wd John Deer 6110   |
| Machinery Rental (R/ha)      | 4,400 - 7,500 | 4,400 - 7,500 | Cost of renting necessary equipment                                   |
| <b>Labour</b>                |               |               |   |

<sup>126</sup> <https://www.hempcutter.com/>

<sup>127</sup> <https://www.cretes.be/en/machines-index/machines/hemp-harvester>

|                                 |             |             |  |
|---------------------------------|-------------|-------------|--|
| Mechanisation Labour Multiplier | 1.25 - 1.5  | 1.25 - 1.50 |  |
| Mechanisation Labour (hrs)      | 5 - 12      | 5 - 12      | Machinery hours times multiplier   |
| Manual Labour (hrs/ha)          | 500 - 1,100 | 12 - 18     | Note that both grain and straw from dual purpose crop are harvested mechanically and in tandem, only windrowing assumed to be manual |

## E. Post-Harvesting Handling

Post-harvesting requirements differ between grain and straw. Straw from fibre-only crops must be swathed and turned several times over weeks to ensure even retting. This is explained in the previous section and can be done both mechanically or manually, with the latter being more time and effort intensive. Once sufficiently dry and or retted, all hemp straw must be baled and transported for storage before marketing. This can be done both mechanically (using round or square balers and baler handlers for collection) or manually (via collection and “bundling” by hand).

The assumptions (mechanised and manual) for both fibre and dual-purpose crops are summarised below:

**Table 18: Hemp Cultivation - Post-Harvesting Costs for Fibre and Dual Crop**

| Post Harvesting Assumption |                   |               |               |   |
|----------------------------|-------------------|---------------|---------------|---|
| Activity/Input             |                   | Unit /Average |               | Comments  |
|                            |                   | Fibre         | Dual Crop     |   |
| <b>Machinery</b>           |                   |               |               |   |
| Machinery                  | Hours (hrs/ha)    | 7 - 12        | 3 - 6         | Implement windrowing (swather) or equivalent.   |
| Machinery Cost (R/hr)      |                   | 230 - 600     | 230 - 600     | Variable costs  |
| Fuel Consumption (l/hr)    |                   | 7 - 9         | 7 - 9         | Based on 4wd John Deer 6110   |
| Machinery                  | Rental (R/ha)     | 3,200 - 6,400 | 3,200 - 6,400 | Rental costs  |
| <b>Labour</b>              |                   |               |               |   |
| Mechanisation              | Labour Multiplier | 1.25 - 1.50   | 1.25 - 1.50   |   |
| Mechanisation              | Labour (hrs)      | 8.75 - 18     | 8.75 - 18     | Machinery hours times multiplier  |
| Manual Labour (hrs/ha)     |                   | 140 - 180     | 98 - 126      | Equivalent time required to run manually. Assumption: Grain harvest and cutting of stalks will be done mechanically (Combine Harvester); windrow manually after harvest for drying. |
| <b>Grain Handling</b>      |                   |               |               |   |
| Cleaning (R/MT)            |                   | n/a           | 70 - 900      | Cleaning and drying are outsourced. Cost depends on cleaning rate and only applies if the screening percentage would be more than 6% but limited to a maximum of 15%.               |

|                |     |           |   |
|----------------|-----|-----------|---|
|                |     |           | Includes removal of debris, stalk pieces, dust, and seed conditioning. Licensing and regulatory compliance for food-grade hemp may add to costs   |
| Drying (R/MT)  | n/a | 170 - 200 | Like other grains but drying parameters differ due to hemp seed moisture content (15% which needs to be dried to 8%).   |
| Storage (R/MT) | n/a | 170 - 200 | Monthly; Storage tariffs vary greatly by facility type and duration. Approximate range (excl. VAT) for typical grain storage setups: R180/MT season tariff plus handling costs R90/MT. Includes bin/silo rental depreciation, pest control, and monitoring. Excludes e.g., admin costs, certifications, weighing. Bagging is R170 - R200/MT (bags excluded) |

Hemp grain is handled very similarly to other grain/oilseed crops common to South Africa. Harvested grain is collected and brought to a central facility for handling prior to storage. Typically, the grain is pre-cleaned before drying to a moisture content suitable for storage (typically 8%). Given that this must take place very soon after post-harvest to prevent spoilage, a more efficient mechanical method using dryers (vs. air-drying, at the mercy of external environmental factors) has been assumed. Indeed, mechanical drying is not only more efficient, but also more efficacious, ensuring even drying and much lower spoilage. Once dried, the grain is stored in a silo.

### Results of Cultivation Analysis

Overall, the modelled total cost of production (break-even point, including both variable and fixed costs) for cultivating 1ha of fibre and dual-purpose crops, ranges from R55,500-R80,000 and R47,000-R56,600, respectively. This is notably much higher than for comparable grain crops (R7,000-R20,000 for maize, sunflower, or soybeans).<sup>128</sup> However, caution is advised when making like-for-like comparisons due to commodity-specific factors and the fact that this represents only one part of the broader picture. This is discussed in greater detail later in this Chapter, but suffice to say here that this has implications on attracting different types of farmers to switch to hemp cultivation. Significant differences in local contexts and a restricted scope precluded benchmarking these production costs against international comparators. Consequently, like-for-like comparisons should be avoided.

**Table 19: Total specified variable and fixed costs (break-even costs), total and per unit**

| Production Model       | Fibre-Crop (average) |               | Dual-Purpose (average) |               |
|------------------------|----------------------|---------------|------------------------|---------------|
|                        | Per ha               | Per kg Output | Per ha                 | Per kg Output |
| Labour-intensive       | R80,030.09           | R7.28/kg      | R51,586.61             | R6.34/kg      |
| Mechanisation (rental) | R66,583.97           | R6.05/kg      | R56,939.34             | R7.00/kg      |
| Mechanisation (owned)  | R55,476.82           | R5.04/kg      | R47,109.74             | R5.79/kg      |

<sup>128</sup> All comparator or benchmark prices for other South African grain/oilseeds crops were sourced from GrainSA <https://www.grainsa.co.za/plan-for-a-profitable-2025/2026-season>

A cost breakdown to understand the key drivers and identify potential opportunities for optimising these for both fibre and dual-purpose crops, and across the 3 production models is included below. This is then followed by an analysis of key cost drivers.

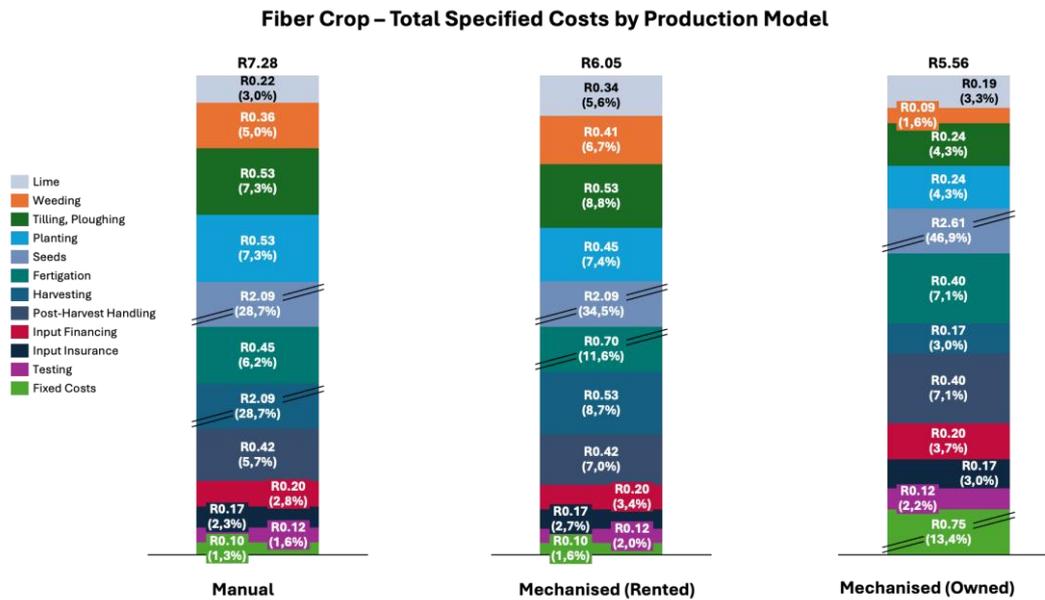


Figure 34: Fibre Crop - Total Specified Costs by Production Model<sup>129</sup>

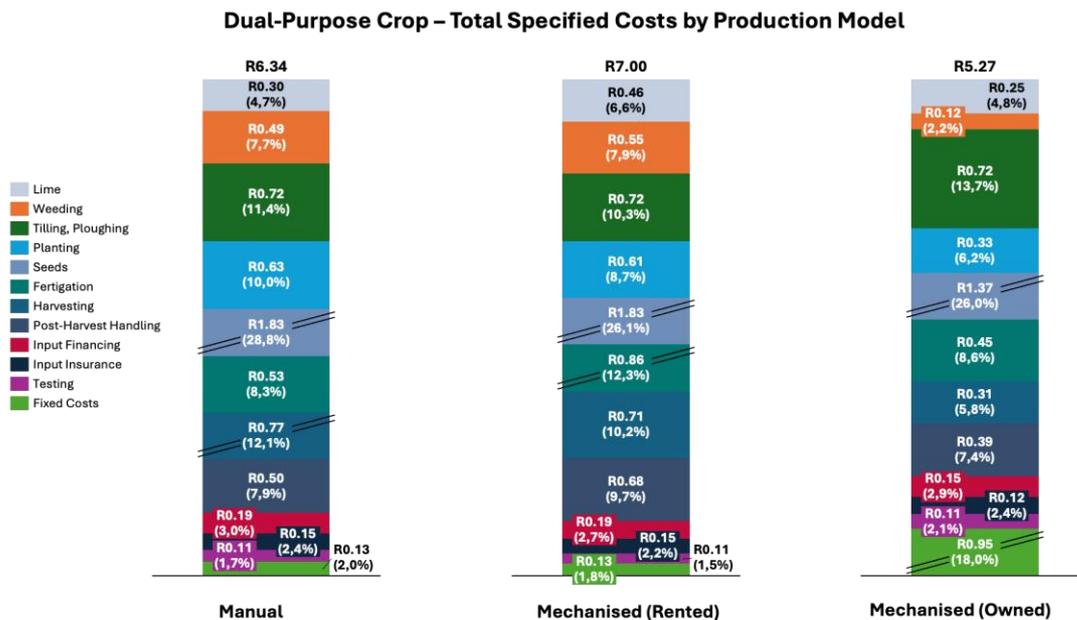


Figure 35: Dual-Purpose crop: Total Specified Costs by Production Model<sup>130</sup>

<sup>129</sup> Image source: Zageta Solutions, 2025.

<sup>130</sup> Ibid.

**Seed:** Across all three production models, the cost of propagating materials (i.e., seed) is the major driver of cost, ranging from 28% to 46% of all specified variable and fixed costs (i.e., “total production costs”). Given the high planting density required for fibre vs. dual-purpose crop, the seed cost was higher in both absolute and relative terms for the former. By comparison, this ranges from 8%-12% for comparator crops, which have significantly lower sowing densities (i.e. only 20-25kg/ha vs. up to 120kg/ha for fibre-only crop)<sup>131</sup> as well as lower seed costs. The high seed cost can be attributed to several factors, chiefly (i) limited global supply stocks against rapidly growing demand, (ii) South Africa’s almost exclusive dependence on imported seed and the associated logistics and clearing costs, and (iii) the volumes of seed currently procured.

As global seed production scales over the next several years, it is expected that increased supply will temper higher prices in the medium to long term. In the short-term, however, South African farmers (or through local seed suppliers) must rely on imports as they await several varieties (see Chapter 2s and 3) to be registered and produced/multiplied locally. Based on feedback from local farmer associations and seed suppliers, while the unit cost of hemp seed can be as low as USD 3-7.5/kg (i.e., as much as ~R128/kg)<sup>132</sup> in source markets, the marketed prices in South Africa are on average R270/kg.<sup>133</sup> Notwithstanding the distributor’s margin, this cost accounts for phyto-sanitary compliance, logistics, excise and customs duties, and VAT.

Furthermore, since local seed suppliers/distributors do not typically hold large stocks in inventory (given costs and quality issues) they procure seeds internationally on order, typically 12 months prior to planting. Given import requirements, it is most cost-effective to procure at early and at scale, and indeed one supplier also noted the benefit of improved logistics technology (e.g. cold chain) that protects the quality of delivered seed. Of course, limited commercial production in SA and small production plots (despite larger permitted allocations) means that farmer demand for seed is “sub-scale” both in aggregate and on an individual farmer basis. This is also exacerbated by individual farmers, growing at relatively small scale, requiring a variety of hemp genetics (as selection is often dictated by a buyer), and increasing the sourcing or procurement costs for seed distributors.

**Fertilisers:** Fertilisers are another a key cost driver across all production models and fibre and dual-purpose crops - since they are critical for increasing potential productivity or yield of the plant - and account for 5-12% of total specified fixed and variable production costs. As a share of total costs, this is lower than for comparator grain crops in South Africa (e.g., as high as 18-30% for maize, sunflower and soybeans); however, in absolute terms per ha, it is much higher (e.g. roughly R3,000 per ha). For example, based on literature validated by farmers both in South Africa and in other countries in similar latitudes (e.g., Uruguay and Argentina), hemp fibres require a high nitrogen input and potentially even top dressing (LAN/KAN) to ensure optimal productivity in quantities of as much as 300kg/ha. Since South Africa relies heavily on imported fertilisers, which have increased faster in cost than productivity over the last decade (due to various exogenous factors including recent geo-political tensions and weaker Rand), this cost is expected to remain high for the foreseeable future.

---

<sup>131</sup> Germination rates also influence sowing densities to achieve optimal planting densities, however plant population numbers for hemp are nevertheless much higher (+3 million vs. 100,000 for maize).

<sup>132</sup> Assuming exchange rate of R17/USD as accessed from [www.xe.com/ucc](http://www.xe.com/ucc) on November 30<sup>th</sup> 2025.

<sup>133</sup> Based on interview with South Africa’s largest hemp seed supplier, and confirmed by various farmers and farming associations. Notably, if seeds are ordered “last-minute”, farmers have often paid as much as R400/kg.

**Manual labour:** For the labour-intensive model, the cost of labour for all relevant production stages (lime application, weeding, planting, fertilising, straw only harvesting and collection) and for both fibre-only and dual-purpose crop is the second highest cost driver (30-50% of all specified fixed and variable costs). Given a set minimum wage, this cost is driven by the time-consuming and energy-intensive effort that each stage requires, with planting and harvesting being the most intensive at an estimated number of hours per hectare ranging from 140-200 and 500-1,100, respectively.<sup>134</sup> Harvesting and collection are the most labour-intensive since straw is harvested from both dual-purpose and fibre-only crops, although more intensive for fibre-only crops since dual-purpose yields 40-60% less straw. Since it is assumed that grain harvesting is done using a combine harvester (given practicalities of manually harvesting grain from plants as tall as 4 meters, as reported by farmers in Gauteng and Limpopo from last season), and that a sickle bar mower implement can be attached to harvest the straw simultaneously, most of the labour for grain production lies in land preparation, planting, and final manual baling and transport of straw. In economic terms, the harvesting of fibre-crop straw alone can cost as much as R2.00/kg (or roughly R22,000/ha); this is notably multiples greater than the total variable costs of comparable grain crops (i.e., R8,000/ha for sunflower or soybeans).

The labour-intensity of hemp cultivation presents an attractive opportunity for job creation, even seasonally, particularly in South Africa's rural areas. However, the practicality of manual labour for key production stages needs to be considered not only given the overall cost but also the total time required (notwithstanding that this can be distributed among many more units of labour) but also the quality and effort. For example, retting is a critical process for ensuring high-quality fibres and timing is critical since under-retted straw increases downstream processing effort and fibre breakage while over-retted straw leads to significant bast fibre waste and usability for fibres. Further, given high straw's high water absorption capacity (as much as 3 times its weight)<sup>135</sup> and relatively thick diameter (up to 2.5mm), it also means a relatively high density when "raw" or "wet" (the state in which it is harvested), and hence a significant effort to undertake manually. This effort is even greater for dual-purpose crop relative to fibre-only crop since, even if accounting for the lower total straw yield (volumes), the longer maturing plant to allow for grain development also results in greater lignin content (which lends strength to biomass) in its straw. In colloquial terms, this may be considered "back-breaking" with implications for occupational health and safety.

**Mechanisation:** Mechanisation is another key cost driver for the mechanisation models, but there are important distinctions between the rented vs. ownership models. On a small scale, the capital outlay required for equipment procurement is prohibitively high. However, for South African farmers who own their equipment and already grow other crops at an appreciable scale, while they have associated fixed costs (e.g., depreciation, amortisation, and interest etc.) that renters may not incur, their running costs are significantly lower. Most equipment providers lease/contract their machinery on a price per ha basis (e.g., R1,800-4,400/ha). This is an "all-in" cost including fuel,

---

<sup>134</sup> One enterprise budget developed by a provincial department of Agriculture suggests as much as 1,600 hours for harvesting straw manually – Western Cape Department of Agriculture.

<sup>135</sup> "For the water absorption, dry hemp shiv absorbed around three times its weight (325%) after 48 hours with very fast absorption kinetics during the first minute (198% - around 60% of the final value)." In: Dinh, M., Magniont, C., Coutand, M., Escadeillas, G., (2015). Hemp Concrete using Innovative Pozzolanic Binder. Paper presented at. First International Conference on Bio-based Building Materials June 22nd - 24th 2015 Clermont-Ferrand, France.

machinery/operator driver, and a suitable tractor; however, it does not include the cost of machinery transportation, which can range from R22/km - R40/km depending on several factors including road conditions. In general, but particularly for large (in km<sup>2</sup>) provinces such as KZN or the Northern Cape and distances from equipment providers, the cost of transportation for a 1ha scale can often be more than the rental cost (e.g., R2,000 for 25km distance at cost of R40/km). For existing commercial farmers who are highly mechanised, the switch over cost is likely to be low (though not necessarily negligible) since many already own requisite and appropriate technology for hemp cultivation. By comparison, it is estimated that the capital outlay for new farmer entrants may be in the range of R15-R20 million,<sup>136</sup> which will only be viable to procure when they are intending to grow (any crop, including hemp) at scale. This may present challenges for inclusion if farmers are not aggregated in some way.

**Other Economic Drivers:** Inputs pre-financing (working capital) and insurance (only for inputs) account for 2-3% across all models for both dual purpose and fibre-only crop. Compared to similar grain crops, this is a relatively smaller share given that financing costs for grain crops also include crop insurance and typically price hedging. However, assuming similar interest rates (prime and margin) and insurance premiums, the total absolute cost of financing or protecting hemp is higher than benchmarks given the higher total costs of inputs (particularly seed).

**Fixed Costs:** The share of fixed costs in total specified costs is an important cost driver, accounting for anywhere between 1.2% and 16% for both fibre and dual-purpose crops and depending on production model. Fixed costs are higher for mechanisation options given the associated machinery ownership costs, which comprise the bulk (+80%) of total fixed costs for hemp cultivation. Compared to other grain crops, whose shares of fixed costs in total production costs range from 20-30%, this share is lower (though this is higher in absolute terms). Similarly, scale as well as productivity will obviously have an impact on returns, considered further below.

**Returns:** From a plant product perspective and based on the assessment, planting fibre-only crops provide better returns (i.e., above all specified costs) to farmers under all production methods considered, ranging from roughly (R11,300) to R13,300/ha compared to (R6,300) to R3,500/ha for dual-purpose crop. This finding must be read with caution since hemp grain farming in South Africa is nascent, even for research purposes as hemp-for-grain was previously excluded from both the National Department of Agriculture (through the ARC) trials that began in 1999 as well as exemptions from the schedules of the Medicines and Controlled Substances Act.<sup>137</sup> Nevertheless, based on international feedback from other farmers, and confirmed further below by the sensitivity analysis, the major driver of viability of hemp grain, given a relatively high price compared to other “super” grains, is the yield, which is discussed in more detail below.

---

<sup>136</sup> Based on estimated capex of a full suite of machinery and implements (including tractors). Figures are drawn from the National Department of Agriculture <https://www.nda.gov.za/index.php/publication/138-economic/326-machinery-cost>

<sup>137</sup> Blouw, Langa Sunshine. (2012). Effect of cultivar on the quality of flax and hemp grown in South Africa. PhD Thesis. Nelson Mandela University (NMU).

## A. Fibre-Crop Returns

**Table 20: Fibre Crop - Returns Analysis per ha and per kg**

| Production Model       | Benchmark Price                          | Revenues (average) | All Specified Costs per (average) | Fibre-Crop Return (per ha average) | Fibre-Crop Return per kg (average) |
|------------------------|--|--------------------|-----------------------------------|------------------------------------|------------------------------------|
| Labour-intensive       | R6.25/kg for retted straw <sup>138</sup> | <b>R68,750.00</b>  | R80,030.09                        | <b>(R11,280.09)</b>                | <b>(R1.03)</b>                     |
| Mechanisation (rental) |  |                    | R66,583.97                        | <b>R2,166.03</b>                   | <b>R0.20</b>                       |
| Mechanisation (owned)  |  |                    | R55,476.82                        | <b>R13,273.18</b>                  | <b>R1.21</b>                       |

The table above shows that both mechanisation models for fibre-crop production are viable, with returns increasing with ownership of machinery. Of course, the ownership model assumes that farmers grow on a sufficient scale (generally, including of other crops) to justify capital outlay and fixed costs, and can make earnings multiple larger than comparable grain crops in South Africa. The rental model is also viable, with returns of some R2,200/ha or R0.20/kg. This return is, in reality, conservative given that transportation costs (“fixed” for distance travelled) of rented machinery are disproportionately high when growing only on a single ha. In practice, farmers would need a minimum cultivation scale to justify these costs and therefore often either grown on larger plots or split the costs with other farmers through a shared model. The labour-intensive model is the least viable considered for fibre-only crops, this is largely driven by the effort required to undertake, and the associated cost of, manual work. This is most intensive during harvesting and reflective in unit cost (+R2/kg) higher than the highest return of the most profitable farmer (R1.21). There is limited pathway to viability via scale under these assumptions given that fixed costs make up a relatively small share of revenues in general for hemp, but are particularly low for labour-intensive farmers. It may be more fruitful to explore opportunities to rather optimise the biggest cost drivers.

By comparison, both mechanisation models provide pathways to returns optimisation through scale (since they are already viable even on 1ha). The mechanised-rented option would yield the biggest benefits from scale across the three models, given the economising of “fixed” transportation costs described above. The labour-intensive model benefits little from scale in terms of a per ha or per kg returns and would in absolute terms significantly increase losses.

**Table 21: Fibre Crop - Returns Comparison by scale**

| Production Model       | Returns per ha |                           | Returns per kg |         |
|------------------------|----------------|---------------------------|----------------|---------|
|                        | 1ha            | 5ha                       | 1ha            | 5ha     |
| Labour-intensive       | (R11,280.09)   | (R10,440.09)              | (R1.03)        | (R0.95) |
| Mechanisation (rental) | R2,166.03      | R17,286.03 <sup>139</sup> | R0.20          | R1.57   |
| Mechanisation (owned)  | R13,273.18     | R19,846.37                | R1.21          | R1.80   |

<sup>138</sup> This is the average price reported by South Africa stakeholders of assumed to be required to make cultivation viable under South African conditions. Without reliable benchmarks, this is a good starting point, informed also by the simultaneous analysis on impact to processing capability.

<sup>139</sup> This return is slightly overstated given that the economised transportation costs do not include driver lodging for any overnight stays given insufficient time required to performed task within a single working day. Nevertheless, given the relatively much lower cost of accommodation, the impact of scale on returns to these farmers is clear.

## Sensitivity Analysis (Fibre)

For fibre-only crop, the most important factors influencing net returns include (i) price, (ii) yield, and (iii) cost of seed. Straw prices tend to be sticky since they have a material impact on the profitability of processing operations. The current price offered to farmers under these models is higher than estimates in other markets (although a like-for-like comparison is unhelpful), and it is likely that these will remain sticky. A focus on yield improvements may yield greater returns since these may be improved through better genetic selection, improved production processes and inputs (including higher seeding density or fertiliser), aspects that farmers, with increasing skills, may be able to manage and enhance over time. Below the price/yield sensitivity tables for the Mechanisation (Rented) model are included and are illustrative, but have produced one for each scenario in the model/tool attached.

**Table 22: Sensitivity Analysis (Yield and Price) - Fibre-Only Crop**

### Fiber Crop - Mechanization (Owned)

| Price (R/kg) | Yield (kg/ha) |             |             |             |             |             |             |            |            |            |
|--------------|---------------|-------------|-------------|-------------|-------------|-------------|-------------|------------|------------|------------|
|              | 8,000.00      | 8,500.00    | 9,000.00    | 9,500.00    | 10,000.00   | 10,500.00   | 11,000.00   | 11,500.00  | 12,000.00  | 12,500.00  |
| 4.00         | (23,476.82)   | (21,476.82) | (19,476.82) | (17,476.82) | (15,476.82) | (13,476.82) | (11,476.82) | (9,476.82) | (7,476.82) | (5,476.82) |
| 4.25         | (21,476.82)   | (19,351.82) | (17,226.82) | (15,101.82) | (12,976.82) | (10,851.82) | (8,726.82)  | (6,601.82) | (4,476.82) | (2,351.82) |
| 4.50         | (19,476.82)   | (17,226.82) | (14,976.82) | (12,726.82) | (10,476.82) | (8,226.82)  | (5,976.82)  | (3,726.82) | (1,476.82) | 773.18     |
| 4.75         | (17,476.82)   | (15,101.82) | (12,726.82) | (10,351.82) | (7,976.82)  | (5,601.82)  | (3,226.82)  | (851.82)   | 1,523.18   | 3,898.18   |
| 5.00         | (15,476.82)   | (12,976.82) | (10,476.82) | (7,976.82)  | (5,476.82)  | (2,976.82)  | (476.82)    | 2,023.18   | 4,523.18   | 7,023.18   |
| 5.25         | (13,476.82)   | (10,851.82) | (8,226.82)  | (5,601.82)  | (2,976.82)  | (351.82)    | 2,273.18    | 4,898.18   | 7,523.18   | 10,148.18  |
| 5.50         | (11,476.82)   | (8,726.82)  | (5,976.82)  | (3,226.82)  | (476.82)    | 2,273.18    | 5,023.18    | 7,773.18   | 10,523.18  | 13,273.18  |
| 5.75         | (9,476.82)    | (6,601.82)  | (3,726.82)  | (851.82)    | 2,023.18    | 4,898.18    | 7,773.18    | 10,648.18  | 13,523.18  | 16,398.18  |
| 6.00         | (7,476.82)    | (4,476.82)  | (1,476.82)  | 1,523.18    | 4,523.18    | 7,523.18    | 10,523.18   | 13,523.18  | 16,523.18  | 19,523.18  |
| 6.25         | (5,476.82)    | (2,351.82)  | 773.18      | 3,898.18    | 7,023.18    | 10,148.18   | 13,273.18   | 16,398.18  | 19,523.18  | 22,648.18  |
| 6.50         | (3,476.82)    | (226.82)    | 3,023.18    | 6,273.18    | 9,523.18    | 12,773.18   | 16,023.18   | 19,273.18  | 22,523.18  | 25,773.18  |
| 6.75         | (1,476.82)    | 1,898.18    | 5,273.18    | 8,648.18    | 12,023.18   | 15,398.18   | 18,773.18   | 22,148.18  | 25,523.18  | 28,898.18  |
| 7.00         | 523.18        | 4,023.18    | 7,523.18    | 11,023.18   | 14,523.18   | 18,023.18   | 21,523.18   | 25,023.18  | 28,523.18  | 32,023.18  |
| 7.25         | 2,523.18      | 6,148.18    | 9,773.18    | 13,398.18   | 17,023.18   | 20,648.18   | 24,273.18   | 27,898.18  | 31,523.18  | 35,148.18  |
| 7.50         | 4,523.18      | 8,273.18    | 12,023.18   | 15,773.18   | 19,523.18   | 23,273.18   | 27,023.18   | 30,773.18  | 34,523.18  | 38,273.18  |
| 7.75         | 6,523.18      | 10,398.18   | 14,273.18   | 18,148.18   | 22,023.18   | 25,898.18   | 29,773.18   | 33,648.18  | 37,523.18  | 41,398.18  |
| 8.00         | 8,523.18      | 12,523.18   | 16,523.18   | 20,523.18   | 24,523.18   | 28,523.18   | 32,523.18   | 36,523.18  | 40,523.18  | 44,523.18  |

In addition to yield and price, the seed cost is also an important consideration given its contribution to variable costs, which account for +70% of all costs. Since the landed cost of seed may be reduced through various interventions (whether bulk or duty or VAT exemptions), there may be credible opportunities for optimisation. As such, a +/-25% change to the seed cost (*ceteris paribus*) has been applied, to reflect noticeable impacts on returns as detailed in the table below. This alone may not be transformative for labour-intensive farmers but would result in at least +/-50% increase in returns for mechanised farmers.

**Table 23: Sensitivity Analysis (Seed Toggle) - Fibre only**

| Fibre-Crop            | Returns per kg based on Different Seed Cost Scenarios |         |                   |
|-----------------------|---|---------|-------------------|
|                       | Bull (25% Lower)                                      | Base    | Bear (25% Higher) |
| Labour-Intensive      | (R0.43)   | (R1.03) | (R1.62)           |
| Mechanisation (rent)  | R0.79   | R0.20   | (R0.40)           |
| Mechanisation (owned) | R1.80   | R1.21   | R0.61             |

## A. Dual-Purpose - Returns

By comparison to fibre-only crops, dual-purpose crop farming is viable on 1 ha when machinery is owned and marginal or challenged under other production models investigated as shown in the table below.

**Table 24: Total specified variable and fixed costs (break-even costs)**

| Production Model       | Benchmark Price  | Revenues (average) | All Specified Costs (average) | Dual-Purpose Return per ha (average) | Dual-Purpose Return per kg (average) |
|------------------------|--|--------------------|-------------------------------|--------------------------------------|--------------------------------------|
| Labour-intensive       | R25/kg for grain <sup>140</sup> and R3.69 for un-retted straw <sup>141</sup> | <b>R50,634.47</b>  | R51,586.61                    | <b>(R952.14)</b>                     | <b>(R0.12)</b>                       |
| Mechanisation (rental) |  |                    | R56,939.34                    | <b>(R6,304.87)</b>                   | <b>(R0.78)</b>                       |
| Mechanisation (owned)  |  |                    | R47,109.74                    | <b>R3,524.73</b>                     | <b>R0.43</b>                         |

In the absence of local information about pricing for straw from dual-purpose crops, it is assumed that un-retted straw fetches a market price that is roughly 60-70% of the retted straw<sup>142</sup> given differences in quality and downstream usage (e.g., more non-woven, technical fibres). Based on the above table, the owned mechanisation model offers a positive net return while the labour-intensive model appears marginal. Surprisingly, the labour-intensive model offers better returns than the rented mechanised. In reality, this is distorted by two factors. First, fixed transportation costs are not economised since this model assumes growing only at 1 hectare (see above). Under the rented mechanisation model, the transportation costs are almost R20,000 per hectare. Second, it is assumed that dual-purpose crops are harvested mechanically under all production models, using a combination of a combine (to remove grain) and sickle mower (to cut residual straw) deployed in tandem. Since the straw from dual-purpose does not require mowing manually - the most time-consuming and cost-intensive exercise - the labour-intensive model shows lower costs than mechanised rented.

Generally, the average yield on hemp grain remains a constraint to scaled adoption of hemp (including for other 6 demand pathways not prioritised, such as Biofuels). Compared to other grain crops, which have higher yields (about 2-8MT/ha vs about 1MT/ha for hemp grain) and lower production costs, hemp is comparatively more expensive across all stages of production. Hemp is already significantly higher-value<sup>143</sup> than comparable grains and its demand may mean sustainably high prices even in the medium to long-term. Indeed, data from FAO demonstrates that over the last 2 decades, the yield in grain crops has been largely unchanged, and total production quantities driven

<sup>140</sup> <https://www.senwes.co.za/grain-prices>

<sup>141</sup> Based on ratio of EUR130 (for unretted straw) and EUR 225 (for retted straw) per metric ton prices of hemp in Europe in 2024 as reported by international hemp associations and farmers. This ratio is applied to the Fibre-Crop straw price to arrive at this estimate.

<sup>142</sup> Ibid.

<sup>143</sup> The estimate used in the model is conservative and organic hemp grain prices at farm-gate can be as much as double the figure used for analysis.

more by increase in area harvested (this is the opposite for fibre-only varieties). Efforts by breeders like New West Genetics to improve yields up to 3x conducted outside of South Africa were mentioned earlier; hope remains for the development and commercialisation of hybrid and other higher-yielding varieties. <sup>144</sup>

The impact of scale is much more notable for dual-purpose than for fibre-only crops. Growing for dual purpose at scale results in viable propositions under all production models, this most pronounced under the rented mechanisation model where the transportation “fixed” costs for machinery rental are spread over many more units. Despite very low fixed costs, labour-intensive farmers also benefit from economising harvesting operations (already assumed to be mechanized given impracticality of manual harvesting) that are incurred from renting the requisite machinery.

**Table 25: Dual Purpose Crop - Returns Comparison by scale**

| Production Model       | Returns per ha |           | Returns per kg |       |
|------------------------|----------------|-----------|----------------|-------|
|                        | 1ha            | 5ha       | 1ha            | 5ha   |
| Labour-intensive       | (R952.14)      | R1,927.86 | (R0.12)        | R0.24 |
| Mechanisation (rental) | (R6,304.87)    | R8,815.13 | (R0.78)        | R1.08 |
| Mechanisation (owned)  | R3,524.73      | R9,704.79 | R0.43          | R1.19 |

### Sensitivity Analysis (Dual-Purpose)

For dual-purpose crop, the most important factors influencing net returns include (i) price of grain (holding unretted straw price constant), (ii) yield, and (iii) cost of seed. Prices for hemp grain could be much higher than what has been assumed in this model, including in some cases double what has been estimated for certified organic hemp grain. Again, the yield of hemp grain is relatively stable and without significant availability of higher-yielding varieties, will remain a challenge for the future. The following price/yield sensitivity tables for the Mechanisation (Owned) model are provided for illustrative purposes; individual tables for each scenario are attached in the model/tool.

**Table 26: Sensitivity Analysis (Yield and Price) - Dual Purpose Crop**

#### Dual Purpose Crop - Mechanization Owned

| Price (R/kg) | Yield (kg/ha) |            |            |            |            |          |          |           |           |           |
|--------------|---------------|------------|------------|------------|------------|----------|----------|-----------|-----------|-----------|
|              | 500.00        | 650.00     | 800.00     | 950.00     | 1,100.00   | 1,250.00 | 1,400.00 | 1,550.00  | 1,700.00  | 1,850.00  |
| 21.00        | (10,141.94)   | (8,041.94) | (5,941.94) | (3,841.94) | (1,741.94) | 358.06   | 2,458.06 | 4,558.06  | 6,658.06  | 8,758.06  |
| 21.50        | (9,891.94)    | (7,741.94) | (5,591.94) | (3,441.94) | (1,291.94) | 858.06   | 3,008.06 | 5,158.06  | 7,308.06  | 9,458.06  |
| 22.00        | (9,641.94)    | (7,441.94) | (5,241.94) | (3,041.94) | (841.94)   | 1,358.06 | 3,558.06 | 5,758.06  | 7,958.06  | 10,158.06 |
| 22.50        | (9,391.94)    | (7,141.94) | (4,891.94) | (2,641.94) | (391.94)   | 1,858.06 | 4,108.06 | 6,358.06  | 8,608.06  | 10,858.06 |
| 23.00        | (9,141.94)    | (6,841.94) | (4,541.94) | (2,241.94) | 58.06      | 2,358.06 | 4,658.06 | 6,958.06  | 9,258.06  | 11,558.06 |
| 23.50        | (8,891.94)    | (6,541.94) | (4,191.94) | (1,841.94) | 508.06     | 2,858.06 | 5,208.06 | 7,558.06  | 9,908.06  | 12,258.06 |
| 24.00        | (8,641.94)    | (6,241.94) | (3,841.94) | (1,441.94) | 958.06     | 3,358.06 | 5,758.06 | 8,158.06  | 10,558.06 | 12,958.06 |
| 24.50        | (8,391.94)    | (5,941.94) | (3,491.94) | (1,041.94) | 1,408.06   | 3,858.06 | 6,308.06 | 8,758.06  | 11,208.06 | 13,658.06 |
| 25.00        | (8,141.94)    | (5,641.94) | (3,141.94) | (641.94)   | 1,858.06   | 4,358.06 | 6,858.06 | 9,358.06  | 11,858.06 | 14,358.06 |
| 25.50        | (7,891.94)    | (5,341.94) | (2,791.94) | (241.94)   | 2,308.06   | 4,858.06 | 7,408.06 | 9,958.06  | 12,508.06 | 15,058.06 |
| 26.00        | (7,641.94)    | (5,041.94) | (2,441.94) | 158.06     | 2,758.06   | 5,358.06 | 7,958.06 | 10,558.06 | 13,158.06 | 15,758.06 |
| 26.50        | (7,391.94)    | (4,741.94) | (2,091.94) | 58.06      | 3,208.06   | 5,858.06 | 8,508.06 | 11,158.06 | 13,808.06 | 16,458.06 |
| 27.00        | (7,141.94)    | (4,441.94) | (1,741.94) | 958.06     | 3,658.06   | 6,358.06 | 9,058.06 | 11,758.06 | 14,458.06 | 17,158.06 |

<sup>144</sup> The authors are aware of some NWG trials underway across South Africa but were unable to source performance data.

In addition to price and yield, the cost of seed for dual-purpose farmers is similarly important. The same +/-25% change to the seed price was applied to understand the impact on returns across different models of dual-purpose crop production. In summary, a lower seed cost would yield positive net returns for labour-intensive farmers and make their production viable. It would also have material impacts on reducing losses under the mechanisation rental model, even potentially making the production viable assuming a larger scale. Finally, farmers under a mechanisation owned model could more than double their net returns.

**Table 27: Sensitivity Analysis (Seed Toggle) - Dual-Purpose Crop**

| Dual-Purpose Crop     | Returns per kg based on Different Seed Cost Scenarios |                |                   |
|-----------------------|---|----------------|-------------------|
|                       | Bull (25% Lower)                                      | Base           | Bear (25% Higher) |
| Labour-Intensive      | R0.41   | <b>(R0.12)</b> | (R0.64)           |
| Mechanisation (rent)  | (R0.25)   | <b>(R0.78)</b> | (R1.30)           |
| Mechanisation (owned) | R0.96   | <b>R0.43</b>   | (R0.09)           |

### Key Take-Aways from Cultivation

Regional variations in climate, soil quality, input availability, and farming practices create significant differences in production costs and crop yields across South Africa. These variations mean that uniform approaches to hemp cultivation are unlikely to succeed. Instead, strategies must be tailored to local conditions. Validation trials across diverse regions are essential to accurately capture costs and yields, reduce uncertainty for farmers, and develop best practices grounded in local realities rather than imported assumptions.

In general, this assessment demonstrates that hemp cultivation in South Africa is economically viable. Commercial viability depends heavily on both the purpose of the crop - whether for fibre, grain, or dual-purpose - and the production model used, including labour-intensive, mechanised rental, or mechanised ownership systems. Labour-intensive models tend to have higher costs and lower returns, while mechanised models, especially those with owned equipment, show greater profitability. However, access to mechanisation remains a barrier for many farmers, particularly smaller-scale or new entrants. There is considerable opportunity for innovation and adaptation in mechanisation technologies and business models, such as equipment rental schemes, to broaden access and scalability.

Yields are a critical factor influencing profitability but require validation through local trials to ensure realistic and reliable benchmarks. Yield quality - not just quantity measured in kg/ha - is equally important, encompassing factors such as oil content in seed crops and fibre strength or fineness in fibre crops. These quality attributes directly affect market value and downstream processing outcomes. Current yield and quality data often come from limited or non-local studies and may not reflect South African growing conditions. Improving genetics through breeding programs, adopting better agronomic practices, and optimising input use could significantly increase both yield quantity and quality over time, enhancing economic viability. A focus on yield improvement is essential for making hemp cultivation more attractive and competitive, particularly in grain production where yields and quality remain comparatively low.

Seed costs are one of the largest and most urgent challenges for hemp farmers in South Africa. Due to limited local seed production and reliance on imports, seed prices are substantially higher than in source

markets, inflating overall production costs. Addressing this issue requires developing local seed multiplication capacity, improving import logistics, and in the short term, implementing financial incentives such as duty or tax exemptions. Beyond immediate cost relief, there is a significant opportunity to invest in seed breeding programs tailored specifically to South African growing conditions. Developing locally adapted, high-quality seed varieties can improve crop performance, increase yields, and enhance resistance to pests and diseases. Establishing robust seed multiplication and distribution networks will reduce dependency on imports, shorten supply chains, and increase availability for farmers at different scales. Supporting these efforts is critical, as reducing seed costs and improving seed quality will not only improve farmer margins but also encourage wider adoption of hemp cultivation and enable the industry to scale sustainably.

---

## 5.2 THE UNIT ECONOMICS OF HEMP PRIMARY PROCESSING IN SOUTH AFRICA

---

The second part of this Chapter aims to understand the viability of processing the farm-gate products and converting them into a range of processed products for downstream manufacturing. It follows on from the cultivation section that precedes this, which is informed by the downstream requirements of the Priority Demand Pathways prioritised in Chapter 4. To meet those requirements and inform future recommendations, the costs and returns associated with grain and straw valorisation must be understood within the South African context. Notably, this section focuses on mid-stream activities for hemp straw

### I. Grain Processing

Primary processing of hemp grain involves dehulling (to remove outer shells) followed by either pressing/crushing or milling (to derive milled grain or oil and seedcake). The technology used for this is not dissimilar to that used for other grain/oilseed crops and, with some modification, can also be suitable for processing hemp grains. Given this, it is assumed that direct processing costs are likely to be similar with the major difference being the cost of input feedstock, where grain hemp is more costly, but also more valuable vis-à-vis standard grain crops when used as a processed product. Similarly, given the high value of farm-gate grain relative to straw and a more reasonable bulk-density, it is easier to transport, and in fact is traded, across international borders. In the absence of a price-discovery mechanism (e.g. SAFEX for grains in South Africa) for grain, cost benchmarks based on landed imported substitutes provide a reasonable alternative. Given these factors, it is assumed that ceteris paribus, South African grain processors would be able to process hemp as cost-competitively as they do other grain crops.

### II. Fibre Processing

By comparison, the most common primary processing method for the identified fibre-based priority Demand Pathways is mechanical separation. This involves either decortication (mostly used for either retted or unretted, shorter straw) or scutching (typically for retted, longer straw) with the latter technology employed for hemp fibres used in clothing and apparel textiles. While these technologies are similar for processing/separating different types of bast fibre crops (e.g., flax-linen, jute etc.), they are fabricated for a specific bast fibre crop (e.g., either flax or hemp) given the morphological differences of their respective straw biomass. As such, hemp decorticators and scutchers do not

have alternative input feedstock to hemp, and viability, holding demand constant, is driven by throughput and machinery utilisation.

Much like grain, there is also no established market price for hemp straw (input feedstock for processors), but there are few reasonable benchmarks such as imports, given hemp straw bulk density limitations. That said, bast fibres and hurds (the primary components of straw) are, and have been, traded internationally for many decades (there are 3 HS codes related to hemp straw and fibres). As such, the landed cost of imported products provides a comparable price benchmark against which to measure the potential for South African processors to be internationally competitive.

At the time of writing, there is no single decortication (nor indeed scutching) capability at industrial scale anywhere in South Africa, a critical “missing middle” gap also highlighted in other sections of the report. As such, it has not been possible to source validated production and local factor cost estimates; instead, a combination of primary desktop research and interviews with experts (equipment manufacturers, farmers, and processors) were used to arrive at estimates potentially suitable to prevailing local conditions. Further, and most importantly, this information cannot be relied upon to make financial investment decisions but is rather aimed at providing some direction towards understanding of the economic viability of mechanical hemp straw processing in South Africa.

### **General Assumptions**

For the analysis, several assumptions have been made that are important to explain in some brief detail here:

- **Greenfield:** Greenfield conditions have been assumed given the current absence of such a local facility.
- **Functional Unit of Analysis:** The unit of analysis is a kilogram of output (processed) product, for both hurds/shivs and fibres, and on a yearly basis (per annum).
- **Time Series:** This model assumes a 10-year outlook, with inputs and outputs calculated on a per annum basis. There is no regard to variations in timing, whether for cashflow (e.g., initial investment vs. equipment lead-time) or feedstock supply (e.g., seasonal supply for only few months of the year).
- **Technology:** A decorticator was chosen for the analysis given that it is best suited for processing shorter hemp straw, which particularly if prepared appropriately, can be used for all the fibre-based Priority Demand Pathways identified. No additional refining technology is included.
- **Location:** Centralised facility sourcing from farmers within a <100km radius. This model assumes that farm-gate produce is all collected from a single source and that the cost of transportation is borne fully by the processor. In some aggregation models, the farmer may incur the costs of transportation to a central collection point (e.g., for other grain crops).
- **Key Inputs:** Given mechanical technology, the two key drivers of production costs are the input feedstock (i.e., straw) and the energy required to separate it into its component parts. While the cost of energy varies significantly across South Africa jurisdiction, this model uses an average price. The straw price is linked to the benchmark price offered to farmers for retted and unretted straw (as presented in the preceding section on Cultivation).

- **Outputs:** In addition to separated hurds/shivs and fibres, straw will also yield some dust, assumed to be up to 15% in this model and considered “waste” - that is, it was assume that the dust is not marketed. Of course, in reality processors elsewhere market this dust for various uses (e.g., briquettes in France, or bio-fillers for plastics in the USA) but these often require additional machinery and processes and hence have been excluded so that only the most foundational costs are considered. Consequently, the product output volumes will be lower than input feedstock volumes.
- **Operating Expenses:** These are inherently variable and this model assumes a range based on interviews with relevant experts operating in other local agro-industrial operations.
- **Fixed Costs:** These include debt servicing costs, insurance, repairs and maintenance, depreciation, and head office overheads, based on general agro-processing assumptions as well as prevailing cost conditions at the time of writing.
- **Financial Support:** No incentives, grants, subsidies or other financial support that may currently, or in future, be available to permitted hemp farmers in South Africa have been included. This ranges from carbon financing, to the Comprehensive Agriculture Support Programme (CASP), and indeed blended financing instruments from the Land Bank, all of which aim to increase the access to finance and reduce its cost. The recommendations section as well as Chapter 6 delve into the implications of this in more detail.
- **Sensitivity:** A sensitivity analysis is provided to understand the impact of the most important factors on returns under different scenarios.

## A. Inputs for Analysis

The analysis assumes a range of theoretical figures based on key production costs. Given the nascency of the sector, demand for processed straw products is considered confirmed and fixed, making supply a key driver of the model.

### I. Fixed Assets and Project Cost

While a range of fixed assets (“direct” capital costs) are required for a processing plant, The estimations have assumed a mechanical decortication plant including associated auxiliary equipment and based on discussions with several OEMs across three continents. Technology is typically fabricated to suite raw material input (since hemp straw grown in different regions can differ even physically) so there are few options for off-the-self equipment. All additional fixed costs are estimated as a proportion of the technology cost and include land and building improvements, transportation, all installation, assembly, piping, electricals etc.

**Table 28: Estimated Cost of Fixed Assets**

| Outlay           | Costs                      | Comments / Assumptions  |
|------------------|----------------------------|---|
| Technology Capex | R60 million <sup>145</sup> | Cost of decortication unit with input capacity of 1,200kg/hr (imported since there are no local OEMs) |

|                           |                              |  |
|---------------------------|------------------------------|--|
| Other Capex               | R21.3 million <sup>146</sup> | Assuming 30-50% of capex for land and buildings, transportation (since assumed imported), installation and assembly, and cabling, piping, electricals etc. |
| <b>Total Fixed Assets</b> | <b>R83.3 million</b>         |  |

In addition to the capex above, an additional “indirect” capital cost for engineering, construction, contractors, and contingency at 35% of the total fixed assets, or roughly R29,5 million has been assumed. In total the (direct and indirect) capital amounts to R113.8 million. Additionally, it has been assumed that 15% of this amount is required in working capital for a total project cost of R122.8 million.

## II. Selected Production Parameters

For the given technology, assumptions have been made on baseline production figures driven by utilisation, the share of modelled production (whether in hours or throughput) in total maximum production potential. Additionally, since hemp straw splits into component physical parts, their distribution is based on averages for dual-purpose and fibre-only straw. This model assumes that residual hemp dust separated from hurds and fibres is considered waste (i.e., a “loss”).

**Table 29: Hemp Processing Inputs - Selected Production Parameters and Assumptions**

| Input                           | Input Value   | Comments / Assumptions  |
|---------------------------------|---|---|
| Utilisation (%)                 | 62.5%   | Just shy of 2, 8-hour shifts  |
| Annual Production (hrs)         | 4,995   |   |
| Annual Straw Procured (kg)      | 5,945,850   | Based on 1,200kg/hr input capacity <sup>147</sup>   |
| Annual Theoretical Outputs (%): | <b>Fibre: 25.0%</b><br><b>Hurds: 60-65%</b><br><b>Waste: 10-15%</b> | Highly variable depending on several factors <sup>148</sup> including genetics, post-harvest handling, production, moisture, processing speed or intensity etc. |

## III. Revenue and Cost Assumptions

A range of key assumptions used to estimate costs and to assess returns is presented. Of these, raw material, and output product, prices are notable. For simplification, given that the value of hemp straw from dual-purpose and fibre-only crops differs - and similarly the value of the fibres therefrom also differ - these have been “blended” into a combined price for the straw and fibres and kept the hurd price unchanged.<sup>149</sup>

**Table 30: Hemp Straw Processing - Revenue and Cost Assumptions**

<sup>146</sup>

<sup>147</sup> Industrial-scale decorticators are typically modular and can have input capacities as high as 10,000 kg/hr according.

<sup>148</sup> An average range of fibre content (% of straw), based on expected yields from a variety of hemp varieties/cultivars has been used.

<sup>149</sup> Operators in international markets noted that the marketability of retted on un-retted hurds may for certain end-uses may depend on related products standards. It is noted that the price of hemp hurds can vary widely depending on their size and end-use (e.g., construction vs. animal bedding).

| Input                           | Input Value (average) | Comments / Assumptions   |
|---------------------------------|-----------------------|--|
| Fibre Price (R/kg)              | R35.20                | Blended average of retted and unretted grades based on per kg international prices                     |
| Hurd Price (R/kg)               | R20.00                | Average of retted and unretted grades based on international prices                                    |
| Straw Price (R/kg)              | R5.17                 | Calculated average of retted and unretted straw price offered to farmers (see Cultivation sub-section) |
| Annual Straw Transportation (R) | R562,345              | Based on fuel costs for a 40ft moving straw from a farm 60km away to processing site                   |
| Installed Capacity (kW)         | 400                   | With 65% consumption   |
| Energy Price (R/kWh)            | R1.83-R3.80           | Variable in South Africa depending on location   |
| Annual Labour Cost (R)          | R2,893,600            | Assuming 4 operators per 8-hour shift earning R40/hr, manager, and assistant                           |
| Testing (%)                     | 0.5%-0.7%             | As a % of sales  |
| Sales and Marketing (%)         | 0.5%-1.5%             | As a % of sales  |

#### IV. Fixed, Financing, and Other Costs and Assumptions

Finally, fixed and financing costs and assumptions are included. It bears noting that the cost of debt given the proposed capital structure and debt period are all expected to have implications on viability for a hemp processor whose supply chain is still under development, as is the case in South Africa. Seasonality is excluded for this assessment as the focus is on a single year, debt financing for businesses with this kind of procurement can impact operations. Despite this impact, these inputs remain fixed in the sensitivity analysis, as fixed-cost optimisation is primarily addressed through scale or capacity utilisation.

**Table 31: Hemp Straw Processing - Fixed and Other Costs and Assumptions**

| Input                   | Input Value     | Comments / Assumptions   |
|-------------------------|-----------------|--|
| Annual Head Office (R)  | R11-R18 million | Based on stakeholder feedback and relevant benchmarks, mostly salaries |
| Working Capital (%)     | 15-17%          | Of total project cost  |
| Debt Financing (%)      | 60%             | Assumes 40% equity and 0% grants or other                              |
| Debt Cost (%)           | 10.25%          | Based on SA prime lending rate   |
| Debt Term (years)       | 5               |  |
| Insurance               | 1-3%            | of total fixed costs   |
| Repairs and Maintenance | 2-3%            | of total fixed costs   |
| Taxes                   | 28%             | Based on SA figures but calculated as flat rate                        |

#### B. Outputs from Analysis

##### 1) Processed Straw Product Outputs

Given input capacity and production hours (utilisation), this decortication facility would process roughly 6 million kg of straw and convert them into 5.2 million kg of fibre and hurd products per year.

Assuming farmers use their full 50-ha permitted allocation, such a processing facility would need to source from at least 13 farmers harvesting crop from roughly 600ha. As discussed previously, this is a small starting base which in reality could be scaled up through modular technology as throughput/supply increases over time.

**Table 32: Processed Hemp Straw Products**

| Annual Production | Kg Processed     | Kg Sold          |
|-------------------|------------------|------------------|
| Fibres            | 1,486,463        | 1,486,463        |
| Hurds             | 3,716,753        | 3,716,753        |
| Waste             | 743,231          | -                |
| <b>Total</b>      | <b>5,945,850</b> | <b>5,202,619</b> |

## 2) Estimated Theoretical Returns

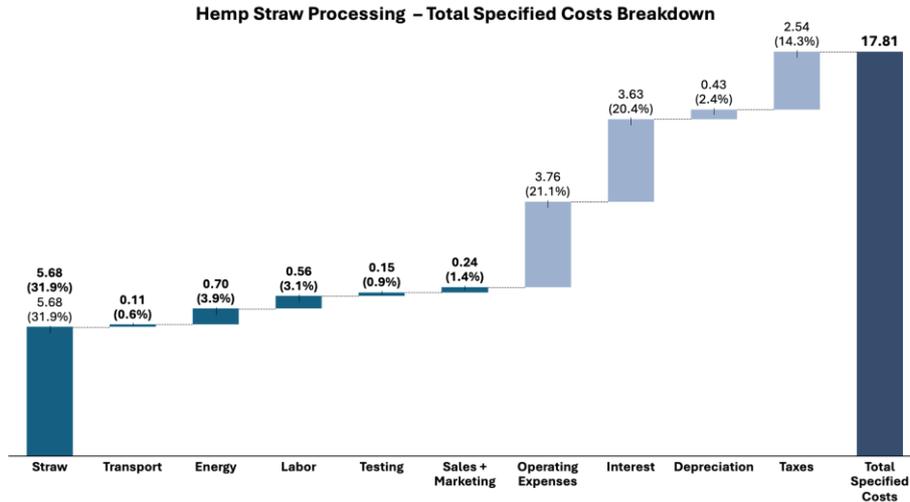
### I. Costs Overview

Overall, the modelled total annual cost of production for a straw hemp processing plant is estimated at roughly R92.6 million, with fixed costs and taxes comprising almost 60% of this. This is unsurprising given the machinery-related costs of industrial-scale production as well as the quantum of volumes processed. On a per kg of processed output product, this equates to roughly R17.81, the break-even price for these operations.

**Table 33: Total specified variable and fixed costs (break-even costs), total and per unit**

|                               | Annual Total      | % of Total Costs | Per kg Output    |
|-------------------------------|-------------------|------------------|------------------|
| <b>Operating Costs</b>        | R38,713,642       | 41.8%            | R7.44/kg         |
| <b>Fixed Costs and Taxes</b>  | R53,922.135       | 58.2%            | R10.36/kg        |
| <b>Total Production Costs</b> | <b>R92,476.82</b> | <b>100.0%</b>    | <b>R17.81/kg</b> |

Below a breakdown of all specified costs is provided and this is followed by a discussion on the main operating or variable costs to identify potential opportunities for optimisation and to determine whether the price offered to hemp farmers (and cost for processors) is sufficient to clear supply and demand in a manner that ensures profitability for both parties. Since fixed costs can be optimised by, among other interventions, scale, such a discussion is reserved for further discussion below in the Sensitivity analysis.



**Figure 36: Hemp Straw Processing - Total Specified Costs Breakdown<sup>150</sup>**

The cost of raw material is the overwhelming driver of and accounts for nearly 32% of total costs and nearly 80% of operating or variable costs. This share in operating costs is perhaps unsurprising given that hemp is a relatively more expensive input feedstock and reflects the relatively low input requirement for processing it. As discussed previously, there is, of course, a natural tension between processors, who seek to minimise their raw material costs, and farmers, who seek to maximise the return for their efforts. Holding all things constant, and assuming both operating cost optimisation and increased scale at cultivation, the modelled farm-gate prices for straw ensure viability across hemp cultivation (for both grain and fibre) and processing. Note that while transportation costs may be relatively low, they add to sourcing costs for processors and therefore also affect the price farmers can fetch for their output. As the distance between sourcing site and processing facility increases, the sourcing costs may become unattractive to processors at current prices.

The other notable driver of operating costs is energy (0.7% of total costs and 9.4% of operating costs), driven by both installed capacity needs and energy prices. Mechanical straw processing generally consumes average amounts of energy, although this can be high considering additional machinery for refinement or with more automated systems. The price of energy in South Africa varies by municipality and although considered globally competitive is challenged by rapid increases that place pressure on total factor costs for processors. Notably, while hemp is largely carbon-neutral plant, its processing nevertheless requires energy whose sources have implications on its carbon footprint. While this was not part of this assessment, the impact of renewable energy and carbon offsetting mechanisms present options linking energy optimisation with the broad decarbonisation agenda in South Africa (including the Just Energy Transition) and elsewhere.

Unlike the business of hemp cultivation, straw processing is largely driven by its associated fixed costs, which make up one third of price (that is, excluding taxes). From a fixed cost perspective, its share in total production costs reflects similar agri-businesses that depend on a single, seasonal input feedstock (e.g., cotton ginneries). In these instances, throughput becomes critical and this is

<sup>150</sup> Image source: Zageta Solutions, 2025.

perhaps more acute for South Africa, where supply stocks may be limited in the short-term even as they may - as capabilities and scale improve - accelerate over time. Operating expenses, which make up 21% of total costs, is largely driven by the cost of salaries, which beyond scale can likely be optimised through resource management, as well as repairs and maintenance costs, reflecting the cost of machinery and can only be feasibly enhanced via scale. Interest costs (20% of total costs) reflect financing requirements, high borrowing costs, and strict terms. Notably, given the criticality of straw processing in unlocking a sector, it is therefore unsurprising that many jurisdictions also provide grants and subsidies (alongside a suite of policy interventions) to finance processors.<sup>151</sup> Finally, taxes make the final portion of fixed costs in this model and reflect both productivity and local conditions.

## II. Viability Assessment

In this section the extent to which the modelled operations as a business would be commercially viable is assessed. To do this, returns based on both net income (understood as revenues less all specified variable and fixed costs) and Internal Rate of Return (IRR) are considered. From a net income perspective, the business is estimated to return R34 million per year (almost 27% margin) from R126 million in sales, indicating positive viability. On a per output unit basis, this is equivalent to a R6.5/kg return from revenues of R24/kg.

**Table 34: Summary of Straw Processing Returns**

| Parameters                         | Total Annual  | Average R/kg Sold | Margin% |
|------------------------------------|---------------|-------------------|---------|
| Revenues                           | R126,646,605  | R24.34            | 100%    |
| Cost of Sales                      | (R38,713,642) | (R7.44)           | 30.6%   |
| Gross Income                       | R86,932,963   | R16.90            | 69.4%   |
| Fixed + Other Costs <sup>152</sup> | (R53,592,135) | (R10.36)          | 42.6%   |
| Net Income                         | R34,010,828   | R6.54             | 26.9%   |

Based on this analysis, the calculated internal rate of return (IRR) is positive viewed across all three time-horizons investigated, suggesting that this hemp straw processing proposition is viable:<sup>153</sup>

**Table 35: Hemp Straw Processing Base IRR**

| IRR | 5-Year | 7-Year | 10-Year |
|-----|--------|--------|---------|
| IRR | 11.9%  | 22.3%  | 27.6%   |

<sup>151</sup> One stakeholder from the EU noted an example where one processor received up to EUR 8 million in grant financing as part of a blended capital raise. (Int3 – Crosscutting)

<sup>152</sup> Includes operating/head office expenses, depreciation, debt repayments, and taxes.

<sup>153</sup> Note that cashflows upon which IRR calculation is based excludes all inflation. Also note that this assessment of viability is not the same as bankability assessment and should be read as “direction of travel” rather than investment advice as noted in the Disclaimer.

Having identified the key drivers of viability, the following section evaluates the most significant factors to determine their impact on returns.

### 3) Sensitivity Analysis

The most important factors influencing the returns on processing - and which have both the highest likelihood of occurrence and relative ability to influence - include (a) the cost of primary technology, (b) the price of straw, the critical raw material, and (c) the throughput or utilisation, which reflects the supply availability, and finally (iv) output market prices, for both hurds and fibres. These have been used these as key input parameters for investigating sensitivity under different scenarios and present the impact to gross and net returns as well as to IRR below.

#### A. Capex Sensitivity

**Table 36: Hemp Processing Sensitivity Analysis - Capex**

| Scenarios    | Downside (+25%) |          |               | Base         |              |              | Upside (-25%) |          |       |
|--------------|-----------------|----------|---------------|--------------|--------------|--------------|---------------|----------|-------|
|              | Returns         |          |               | Returns      |              |              | Returns       |          |       |
|              | R/kg            | Margin % | R/kg          | Margin %     | R/kg         | Margin %     | R/kg          | Margin % |       |
| Gross Income | R16.90          | 69.4%    | <b>R16.90</b> | <b>69.4%</b> | R16.90       | 69.4%        | R16.90        | 69.4%    |       |
| Net Income   | R5.65           | 23.2%    | <b>R6.54</b>  | <b>26.9%</b> | R7.25        | 29.8%        | R7.25         | 29.8%    |       |
| IRR          | 5-Yr            | 7-Yr     | 10-Yr         | 5-Yr         | 7-Yr         | 10-Yr        | 5-Yr          | 7-Yr     | 10-Yr |
|              | -1.4%           | 11.4%    | 18.3%         | <b>11.9%</b> | <b>22.3%</b> | <b>27.6%</b> | 26.6%         | 34.7%    | 38.7% |

The impact of a 25% change ranges from 10-14% on net income and in the “Worse” scenario may make the proposition unviable given a negative IRR. While processors may individually negotiate price discounts with OEMs, the cost may be optimised through interventions that reduce the cost of clearing imported machinery into South Africa.

#### B. Straw Price Sensitivity

Earlier analysis addressed the current lack of a price discovery mechanism for South African hemp and the subsequent need to understand market-clearing conditions. The processor’s sensitivity to the price offered to hemp farmers as well as accompanying analysis on how this impacts the profitability of farming is presented below.

**Table 37: Hemp Processing Sensitivity Analysis - Straw Price**

| Scenarios     | Downside (+25%) |          |               | Base         |              |              | Upside (-25%) |          |       |
|---------------|-----------------|----------|---------------|--------------|--------------|--------------|---------------|----------|-------|
|               | Returns         |          |               | Returns      |              |              | Returns       |          |       |
|               | R/kg            | Margin % | R/kg          | Margin %     | R/kg         | Margin %     | R/kg          | Margin % |       |
| Gross Returns | R15.48          | 63.6%    | <b>R16.90</b> | <b>69.4%</b> | R18.32       | 75.3%        | R18.32        | 75.3%    |       |
| Net Returns   | R5.51           | 22.7%    | <b>R6.54</b>  | <b>26.9%</b> | R7.56        | 31.1%        | R7.56         | 31.1%    |       |
| IRR           | 5-Yr            | 7-Yr     | 10-Yr         | 5-Yr         | 7-Yr         | 10-Yr        | 5-Yr          | 7-Yr     | 10-Yr |
|               | 5.4%            | 16.9%    | <b>22.9%</b>  | <b>11.9%</b> | <b>22.3%</b> | <b>27.6%</b> | 18.1%         | 27.4%    | 32.1% |

Processing returns are more sensitive to straw price than capex cost changes, estimated at roughly +/-16% impact on net income. Under base conditions, the modelled price to farmers allows, in broad terms, both farmers and processors to clear market. With 25% higher prices to farmers (“Worse” scenario for processors), all farmers growing for all purposes and under all production models would be able to farm, at least theoretically, profitably, even on a 1ha plot. By comparison, the processor’s “Better” case scenario, all farming for any purpose or production model would be unviable on a 1ha scale but the impact is more nuanced at scale. At 5ha, for example, farming for any purpose under mechanisation becomes profitable. In general, it would not be unreasonable to expect straw prices to fall alongside farmers costs as the impacts of scaled cultivation and various policy interventions materialise.

### C. Utilisation Sensitivity

As discussed earlier, utilisation or scale is an important driver for economizing costs and improving returns, particularly for this type of business. The impact under the three scenarios is presented along with a discussion regarding implications.

**Table 38: Hemp Processing Sensitivity Analysis - Utilisation**

| Scenarios            | Downside (-25%) |             |              | Base          |              |              | Upside (+25%) |             |              |
|----------------------|-----------------|-------------|--------------|---------------|--------------|--------------|---------------|-------------|--------------|
|                      | R/kg            | Margin %    |              | R/kg          | Margin %     |              | R/kg          | Margin %    |              |
| <b>Returns</b>       |                 |             |              |               |              |              |               |             |              |
| <b>Gross Returns</b> | R16.80          | 69.0%       |              | <b>R16.90</b> | <b>69.4%</b> |              | <b>R17.00</b> | 69.8%       |              |
| <b>Net Returns</b>   | R5.06           | 20.8%       |              | <b>R6.54</b>  | <b>26.9%</b> |              | <b>R7.72</b>  | 31.7%       |              |
| <b>IRR</b>           | <b>5-Yr</b>     | <b>7-Yr</b> | <b>10-Yr</b> | <b>5-Yr</b>   | <b>7-Yr</b>  | <b>10-Yr</b> | <b>5-Yr</b>   | <b>7-Yr</b> | <b>10-Yr</b> |
|                      | -4.9%           | 8.7%        | 16.0%        | <b>11.9%</b>  | <b>22.3%</b> | <b>27.6%</b> | 29.8%         | 37.6%       | 41.2%        |

Based on the analysis, the change in utilisation has a 18-23% impact on net returns, indicating high sensitivity. This is unsurprising given scale higher scale economies for a large fixed-cost driven business. Under the “Worse” scenario (50% utilisation), the impact on net returns is almost proportional to the decrease in utilisation and would yield an unviable proposition (negative IRR in 5 years). While this is not presented in the table above, a “Worst” scenario was modelled at 42% utilisation (equivalent of 3,300 production hours a year, requiring 4,000 MT a year sourced from 436 ha) would significantly reduce net returns down to R3.58/kg (80% reduction), yielding a positive IRR (7.6%) only over a 10-year period.

In addition to demand stimulation and securing market access, there may be a need to invest effort in supporting efforts to rapidly scale up production given how sensitive the model is to utilisation. While this model assumes a flat base utilisation, in reality the process of building up a supply chain, which, while achievable (especially given South African agricultural capabilities), may take time with small production in the early years, scaling up more rapidly. Of course, such investment must also ensure that currently missing capabilities in processing are also simultaneously filled.

## D. Output Price Sensitivity

Finally, some analysis based on the market price of processed hurds and fibres on returns is presented. Note that the base prices are benchmarked against international comparators and are well below prevailing local prices (since the same products must be imported).

**Table 39: Hemp Straw Processing - Output Price Sensitivity**

| Scenarios    | Downside (-25%) |          |               | Base         |               |              | Upside (+25%) |          |       |
|--------------|-----------------|----------|---------------|--------------|---------------|--------------|---------------|----------|-------|
|              | Returns         |          |               | Returns      |               |              | Returns       |          |       |
|              | R/kg            | Margin % | R/kg          | Margin %     | R/kg          | Margin %     | R/kg          | Margin % |       |
| Gross Income | R10.91          | 59.8%    | <b>R16.90</b> | <b>69.4%</b> | <b>R22.90</b> |              |               |          |       |
| Net Income   | R2.23           | 12.2%    | <b>R6.54</b>  | <b>26.9%</b> | <b>R10.85</b> |              |               |          |       |
| IRR          | 5-Yr            | 7-Yr     | 10-Yr         | 5-Yr         | 7-Yr          | 10-Yr        | 5-Yr          | 7-Yr     | 10-Yr |
|              | -20.8%          | -2.6%    | 6.8%          | <b>11.9%</b> | <b>22.3%</b>  | <b>27.6%</b> | 36.1%         | 43.2%    | 46.3% |

Output prices have by far the biggest impact on returns at nearly 66%. At lower prices (“Worse Case”), this process would not only dramatically reduce net returns but also prove the proposition unviable, unless taking a 10-year view (IRR at 6.8%). This scenario is considered unlikely given that demand for hemp fibres, whether locally or abroad, far outstrips supply and the impacts of a switch towards decarbonizing raw materials may mitigate downward pressure on price in the short to medium term. On the upside, a better output market price would yield even more attractive results with IRR nearly more than trebling.

### Key Takeaways on Processing:

- Processing - or the mid-stream - hemp is a critical activity to convert farm-gate products into usable raw materials for downstream manufacturing. While South Africa possesses capabilities in grain processing, **there are glaring gaps for hemp straw processing**. This is an important unlock given hemp straw’s multitudinous uses downstream, but also for unlocking the upstream potential for cultivation of both straw and grain. As noted in Chapter 3, while local downstream demand could theoretically be solved for via imports, operators note challenges in reliable supply and price, and many noted a preference to source locally.
- Based on this analysis, and if operators can secure both markets and supply can be scaled relatively quickly, processing straw in South Africa appears to be a viable proposition. This is an important finding as it confirms, notwithstanding the assessment’s limitations, that the twin opportunities of cultivation and processing present prospects for greater investment and allow for higher value capture locally.
- The costs of mechanical straw processing are not insignificant, whether for an individual business (R150 million) or for the sector more broadly (given the multiple processing facilities required in different geographies). This has materials implications on financing requirements and options, which without tailored instruments and/or other incentives may prove particularly costly, even though the proposition is still viable.
- Scale and throughput are important considerations given their impact on returns and ultimately viability. Important considerations must be made on how to accommodate resolving the chicken and egg problem - where farmers won’t grow without market, and processors won’t invest without

guaranteed supply - while generally how to develop and enhance the supply chain in ways that allow sustainable access to markets.

### 5.2.1 RECOMMENDATIONS

This desktop assessment confirms that the primary cultivation of hemp ranges from marginally unviable to profitable, depending on both the desired plant part and the production method employed. There are, of course, many factors driving economic viability and due to this study's limitations, some important ones were inadvertently excluded. Notwithstanding this, some factors identified present choices to and opportunities for industrial policy makers to enable these in ways that improve farmer returns, since an unprofitable crop is an unattractive crop to a farm and without farmers, competitive downstream localised manufacturing is extremely difficult. "Choices" are specifically noted since even absent of an industrial strategy for hemp, policy makers have tools at their disposal that can change "as-is" marginal viability to "could-be" confirmed viability, as in fact happens in many other sectors of the economy that would otherwise be uncompetitive and unviable. To that end, and based on the directional findings, interventions that may be deployed to ensure, maintain, or improve not only viability but also long-term competitiveness are proposed:

- **Commercial Validation and Data:** There is a dearth of publicly available data on both technical feasibility and economic viability of hemp adapted in South Africa and grown at an appreciable (i.e., commercial scale). While the Agriculture Research Council (ARC), an agency of the National Department of Agriculture, working alongside provincial counterparts, has invested in over two decades of publicly funded research. Based on extensive desktop research and expert engagements, it has not been possible to source or access the results of such trials, including those performed as recently as the 2024/2025 season across various sites in South Africa. From an agronomic perspective, this information provides farmers with the ability to assess the relative performance of various hemp cultivars under different production methods and parameters so that they might make informed choices about their practices. From an economic perspective, this data is critical for securing offtake (as processors typically select or specify genetics based on yields and quality of processed parts), accessing finance (whether for working capital or protection for farmers), securing investment particularly for mid-stream (since financiers often require both guarantees of demand and supply), to name a few. **Policy makers may consider not only how to disseminate this information but also support the validation trials** from which said data is sourced. After all, this study's findings are "directional" only because they have not been validated in real-life settings across South Africa's diverse regions.
- **Seed:** Nevertheless, there are other pressing cost drivers that may benefit from industrial policy interventions. The delivered seed cost to farmers in South Africa is the single biggest driver as discussed above. While scale production stocks will gradually temper the high prices, the cost of seed is also driven by other factors. In the longer term, there is an opportunity for South Africa to contribute its already existing muscle in other seed production to hemp seed production. While this ought to be considered seriously, this process is likely to take time given negotiations with buyers, licensing and material transfer agreements, and stabilisation and multiplication to achieve sufficient stocks of quality-assured seeds. Indeed,

a much-needed focus on breeding or adapting dual-purpose varieties with high female populations and significantly greater yields (e.g., NWG's varieties demonstrate up to 3.5x greater yields than average in trials abroad, yet unvalidated in South Africa) may be necessary but this is likely an even longer and more challenging prospect given other macro seed sector factors. In the short to medium term, policy makers may consider (i) concessionary financing options that reducing the working capital for farmers, (ii) direct subsidies through new or existing conditional grant programmes, including the Comprehensive Agriculture Support Programme (CASP), (iii) trade measures to reduce the cost of VAT and duty costs on imported seed, assured through reciprocal commitments in the short terms and potentially scaled back over time as local capabilities improve or are scaled, and (iv) support for aggregated seed procurement aligned to seasonal production cycles to reduce costs while also improving quality of seed. While the seed quality was not explicitly included in the assessment, the importance of germination rates to total seed sowing requirements is noted; some hemp farmers reported germination rates ranging from 30-80%, in part due to spoilage either from source or during transportation but largely from uncertified seed without requisite quality assurances for farmers and with potentially large consequences given the volumes of seed required for cultivation. While quality assurance may increase the cost of seed to farmers, the relative protection against losses as high as 75% due to poor quality seed has net positive benefits generally but in specifically given a nascent sector in which farmers still need to be convinced to switch to hemp.

- **Mechanisation:** Mechanisation, particularly when owned, provides greater returns to farmers than rented or labour-intensive production models. Below a certain scale, Mechanisation is unviable given the high capex requirements, exacerbated by costly imports. Policy makers may consider (i) interventions that support farmer aggregation to facilitate machinery sharing across many farmers who would on their own be sub-scale, (ii) supporting Mechanisation-as-a-service models with more cost effective logistics to both stimulate other enterprise development in the side stream and reduce costs of or need for ownership, (iii) trade measures that provide incentives such as rebates on the imported machinery, and (iv) asset-assist programmes that provide access to machinery through highly concessionary financing, including for targeted populations such as women or youth.
- **Financing:** in addition to potential financing mechanisms and instruments mentioned above, policy makers may consider how both hemp farmers and processors might benefit from existing or existing sets of capital and non-capital incentives or fiscal transfers. In this section, the regulatory issues are not discussed, but suffice to say that formal removal of hemp from the Drugs and Drugs Trafficking Act (delayed by 18 months since the CfPPA was assented to by the President) is critical for unlocking private finance in this regard. Additionally, while carbon and green financing were not included in this scope, the linkages between hemp's potential for carbon sequestration may provide either subsidies or other additionality financing whether through carbon credits, taxes, and other schemes, voluntary or otherwise.
- **Investment in Mid-stream:** all 5 priority demand pathways identified depend on a market for retted or unretted straw for viability as demonstrated. South Africa's current capability gap makes growing hemp for all the purposes considered in this Chapter unviable. Notably, the preparation and capital requirements for such investment are relatively high, particularly for world-class technology, and feedback from stakeholders suggest costs as much as R120

million once landed and installed. It appears, at a high level, that decortication is economically viable. That said, holding demand constant, the major driver of viability is throughput/input supply since viability for processing often requires minimum utilisation. Given the early stages of sector development, some processors may face challenges in the short-term to make their economic work since supply stocks are negligible. Policy makers may consider suites of instruments that incentivise investment in this technology, (e.g., preparing investible business plans, reducing amortisation burdens, concessionary debt financing, development finance grants etc.) but they must be tailored to the needs of processors. It should be noted that given the dispersed nature of permitted hemp cultivation, the spatial nature of where this mid-stream capability is also important to ensure backward and forward linkages and to benefit from local contexts that may arise (e.g., state infrastructure and assets, including SEZ/IDZs etc.). Since hemp straw transportation costs are high depending on distance, there will be a requirement for multiple decorticators across the country unless other measures to reduce sourcing costs are introduced.

- **Inclusion:** finally, inclusion is an important consideration for nascent industries in South Africa and forms a core part of new industrialisation policy (diversification, decarbonisation, and inclusion). At the primary cultivation level, inclusion takes two forms: integrating emerging or marginalised farmers into formal supply chains or creating livelihoods-rich opportunities via permanent or seasonal job creation. Given the inherent variability in scale, quality, and consistency and the typically higher transaction costs of working with farmers, some intermediaries like an aggregator may be necessary. South Africa has a poor record of small-holder farmer aggregation and while the associated costs are not included in this model, they must nevertheless be considered as they must be borne by some party in the supply chain. Additionally, given the importance of mechanisation to improving farmer returns as well as the prohibitive costs of procuring machinery for small farm units, policy makers may consider how to support farmers better organise themselves to procure shared infrastructure. Furthermore, while manual labour may appear attractive for large-scale job creation, it is either unfeasible or impractical at a larger scale simply due to the related cost and time. That said, even mechanised agriculture stimulates job creation (albeit at a lower scale), but it has the benefit of ensuring more viable livelihoods for both farmers and workers. Policy makers may consider other inclusion measures - particularly upstream and downstream of the farm-gate - as inclusion is understood more broadly than “black farmer inclusion”.

# Ch 6: Industrial Enablers and Recommendations

---

The first five chapters of this study focus on establishing a core evidence base with which to assess the extent of hemp's business case in the South African economy. The key finding from this exercise suggests that there is indeed a business and developmental case, however given that hemp is a nascent industry there is a need for critical industrial enablers to fully unlock the opportunities identified. This final chapter now focuses effort on leveraging the evidence base established to recommend a suite of industrial policy tools, levers, instruments etc. (what is collectively call "industrial enablers") that may be deployed in support of the hemp sub-sector. To do that, it is prudent to make an important note. The introduction established that this study was conducted in the absence of a coherent and clear national strategy or policy for hemp.<sup>154</sup> Conventionally, such a strategy would guide the selection of appropriate supply- and demand-side policy instruments that would collectively inform an industrial plan of action as well as the institutional arrangements thereof. That is, a typical sequence would mean that industrial enablers are *preceded* by an industrial strategic imperative rather than the opposite (i.e., "cart ahead of the horse"). Indeed, there is often a high risk associated with deploying instruments without a clear direction, including resource misalignment, misallocation, or waste as well as inefficiencies that ultimately reduce both the likelihood of achieving, and quantum of, any ambition. As such, the enablers explored and recommendations made cannot be considered to be a substitute for such an industrial sector strategy. Nevertheless, they form a basis of minimum requirements that - based on the evidence collected - South African policy makers ought to consider in pursuit of building a competitive hemp sector. These will, of course, need to be reviewed and revised over time in alignment with, and to enable, a future industrial strategy.

Additionally, while the "enablers" for competitive growth of an infant industry or a hemp sector are generally similar across markets and economies, the recommendations set out below must be cognisant of South Africa's particular context as a developing nation with fiscal and capacity constraints if they are to have any likelihood of successful implementation (if at all). Unlike the preceding chapters, which draw insights primarily from *hemp-specific* experts, this Chapter sought the advice of specifically *non-hemp* experts (9 key respondents) renowned locally and internationally in academia, industrial policy development, finance and investment, public procurement, trade, agri-business, and regulations and who have extensive experience either in infant industry development generally and with South Africa's political economy. These insights are used both to augment the (good practice-informed) evidence base and to situate recommendations within a relevant national context. That said, given the limitation of the scope and other limitations already discussed, these enablers and recommendations should not be considered to be comprehensively exhaustive nor

---

<sup>154</sup> A hemp and cannabis commercialisation policy was published by the DTIC in 2024/2025, but it does not yet address key core pillars of an industrial strategy.

mutually exclusive (notwithstanding key trade-offs that would be informed by an industrial strategy). Industrial enabler recommendations are offered as building blocks towards a competitive sector strategy and its successful implementation.

While this Chapter outlines a broad suite of enabling measures, the evidence of this report so far suggests that given conditions of strategic uncertainty and resource/capacity constraints, the following five cross-cutting priorities (discussed in greater detail later) would be most catalytic for the industry, if pursued decisively:

1. Separate hemp formally and development a clear industrial strategy (potentially linked to own legislation)
2. Aggressively stimulate market to focus on vertical coordination, including critically building missing capabilities.
3. Develop a finance plan for the sector including a Hemp Fund and several blended-instruments linked to business maturity, VC stage, and end-use market. This also includes enabling de-risking mechanisms such as project preparation etc. with pre and post-investment support.
4. Focus on enabling competitive farmer development, with a focus on market access, finance, and skills as key pillars.
5. Provide support to existing emerging industrial champions and initiatives, particularly those focused on clustering and with demonstrated capabilities.

Taken together, these priorities cut across individual policy instruments, institutional arrangements and implementation processes. To advance this agenda this Chapter is structured into the following six sub-sections:

1. **Hemp in the SA policy discourse** - the place of hemp within South Africa's national industrial policy at large, linking hemp's offering to national development and growth objectives and aligning these to other global industry policy trends.
2. **Lessons learned from engagements** - fifteen key insights and takeaways from this Study's engagements, drawing from all the quantitative and qualitative assessments conducted. These form the basis of recommendations.
3. **Industrial policy toolbox (enablers and recommendations)** - sets of demand and supply-side measures that may be deployed to enhance the business, and support the developmental, case. Given the lack of a national strategy, these enablers are anchored more generally on industrial development and specifically on investment stimulation.
4. **Institutional arrangements** - a discussion of institutional arrangements to house, advance, and monitor these recommendations. A relatively brief-sub-section, it offers perspectives on other ways of reimagining these for implementation notwithstanding the current combined National Cannabis and Hemp Masterplan
5. **Industrialisation roadmap (expected outcomes)** - provides a forward-looking guide for the sector's development trajectories and industrial lifecycle outcomes.
6. **Concluding remarks** - a summary of key-takeaways from the Chapter and well as other concluding remarks.

## 6.1. Hemp in the Current Policy Discourse

---

Industrial policy provides a set of supply-side and demand-side measures to build industrial competitiveness through industrial upgrading and the development of new industrial capabilities. Most countries pursue specific industrial policy objectives and outcomes that are dependent on their broader national development goals, and which align with their reading of the challenges and opportunities that present themselves.

Outcomes include shifts to higher value addition; productivity improvement; innovation and technological development; industrial diversification; beneficiation; employment; decarbonisation; export diversification; import replacement; spatial diversification; localisation and regionalisation. In most cases, governments pursue a strategic combination of these outcomes. South Africa's industrial policy objectives are outlined in the National Industrial Policy (NIP), centred around a 3-fold strategy: Diversification; Decarbonisation, and Digitalisation.

- **Diversification** to increase SA's presence in growth sectors, ensuring investment flows into sectors with the highest growth rates; supporting mature sectors to improve competitiveness; improving complexity and sophistication of exports as well as value addition of traded goods; and spatial industrial transformation. Diversification is key to shift the country from path dependent commodity export dependence to higher value added and higher productivity economic activities built on innovation and industrial upgrading. The hemp value chain provides opportunities for animating forward linkages between agriculture and downstream manufacturing creating the building block of a future broader agro-industrial complex in which technologies, production systems, logistics, supply chains and markets are increasingly integrated through shared resources and efficiencies. Hemp also enables traditional manufacturers across the prioritised demand pathways to innovate, adopt new future-leaning technologies and materials, and transition to new higher productivity industrial segments. This is core to the country's broader structural transformation ambitions.
- **Decarbonisation** to mitigate future carbon barriers by reducing the carbon footprint; securing market access for exports; and positioning domestic manufacturers to enter the "green economy". Currently, much of the country's focus has been on reducing carbon emissions through expanding renewable energy, rather than on green industrial policy which develops new green industries as well as transforms existing sectors towards low-carbon outcomes. The current focus on decarbonisation as a core objective of South Africa's industrial policy changes this. The hemp value chain is especially significant for green industrialisation. Hemp has very high rates of carbon sequestration and offers significant opportunities for replacing fossil-fuel based products and materials across various sectors and industrial segments.
- **Digitalisation** (and the use of AI) to raise the competitiveness of all sectors of the economy. Machine learning and AI - Industry 4.0 - is rapidly changing traditional production systems, with AI-powered robotics, automation, virtual simulation, supply chain optimisation, predictive maintenance, among others. Data analytics and AI could help South African farmers leapfrog productivity through improving crop yields (precision farming), developing new high-fibre or high-seed genetics, optimising supply chain efficiencies, and enabling innovation and efficiencies in downstream manufacturing with rapidly shifts to carbon-replacement materials.

Peripheral economy inclusion is also a central policy objective of the National Industrial Policy. The NIP forms a core component of Government's new Growth and Inclusion Strategy (GAIN), which integrates NIP's industrial policy interventions with the structural growth reforms driven through Operation Vulindlela. Strengthened integration with the Presidency and National Treasury (and the Vulindlela PMO) should bring related apex status benefits.

NIP targets over the MTDP period include manufacturing value added growth of 1%; manufacturing export growth of 4.1%; and manufacturing employment growth of 100 000 jobs. Hemp features as a priority in both the Decarbonisation and Diversification pillars of the NIP. Under Decarbonisation it is seen as part of solution under the carbon mitigation objective. Under Diversification, its labour-intensive needs align with the priorities of a manufacturing sector that includes agro-processing; plastics and cosmetics; clothing, textiles, leather and footwear; and furniture.

To be defined as a strategic priority industry by government is important - in all probability, a prerequisite for industrial enablement. However, there are risks which need to be managed, including unrealistic expectations, related information asymmetries, and lack of embeddedness, given its nascent status. These risks are exacerbated by a lack of detail in the NIP and its implementation plan, which references three interventions over the medium term: (1) regulatory reforms, (2) a hemp commercialisation policy, and (3) support for smallholder hemp and cannabis farmers. It is assumed that the detail will come in the hemp commercialisation policy, and in the masterplan, both of which are works in progress.

As a Hemp Industrialisation Study, this report aims to close the more glaring information asymmetries and present the evidence base for a segmented and sequenced set of industrial enablers.

## 6.2. Lessons Learnt from Engagements

---

While hemp has now entered South Africa's national industrial policy discourse as a strategic priority under both the Diversification and Decarbonisation pillars, the current policy framing remains high-level and non-specific. This has created a gap between broader objectives and practical implementation. In this context, strengthening the evidence base becomes a key prerequisite for credible policy design, supplemented by learnings from countries with mature hemp value chains. For an infant industry, the cost of 'reinventing the wheel' is high, including delays in regulatory reform, underdeveloped processing capabilities, investment uncertainty and a fragmented ecosystem - all resulting in real economic opportunity costs. The following section outlines 15 lessons learnt (8 overarching lessons and 7 specific lessons) from the structured engagements with local and international stakeholders to show that hemp industrialisation cannot take a 'one-size-fits-all' policy approach but rather requires multiple coordinated approaches to enable development across the value chain.

### I. Overarching Lessons

The following general and overarching lessons are drawn in part from the data and inferred through analysis, then validated through engagements with more than 47 stakeholders involved in this study:

- A. Need for a strategic imperative** - industrial enablers are exactly that, enablers. They are driven and informed by sets of strategic choices (and trade-offs) that guide the sector's development. This includes the ambition (size, shape, growth etc.), focus (geography, markets, VC segments

etc.), success levers (infant industry support, partnerships, differentiation etc.), and institutional arrangements (structures, processes, systems etc.). Without this, policy makers can often and understandably be overwhelmed by the need to do everything, everywhere, with the same intensity and simultaneously, thereby minimising the potential impact of any of their interventions.

- B. Infant industry development is difficult** - it requires a specific set of measures and instruments to build capability and competitiveness over time. This does not mean crude protectionism, however, particularly since the trade in critical intermediate outputs is fragmented and “short-term” access to these for South African firms may stimulate downstream demand while local supply chains are developed. South Africa’s track record in new sector development is challenged, and a critical review of success factors is required to understand how best to learn from and avoid pitfalls.
- C. Segmentation is critical** - both in terms of distinctions between “hemp” and “dagga”, and across hemp’s multiple parts and end-uses, each varying. The former distinction serves not to distance hemp from cannabis but rather to appreciate the nuanced differences in approach to industrialisation or commercialisation each provides. The latter distinction is equally important given that hemp, depending on its intended purpose, has wildly nuanced characteristics, requirements, costs, productivity and profitability etc. Targeted interventions mean better alignment, allocation, and optimisation of resources.
- D. Demand-led, whole value chain approach** - while supply-side interventions have been critical in unlocking sectoral activity in all markets, this is anchored on a demand-led approach that begins with establishing market needs and requirements (specification, scale, quality, consistency, price) and then orchestrating the supply chain to meet these. Additionally, an “end-to-end” value chain lens is always required, albeit that relative emphasis on particular areas (e.g. upstream vs. midstream, or R+D and finance) varies by market and national ambitions (e.g. to fill gaps, unlock niche competitiveness, link to existing capabilities etc.). This was overwhelmingly identified as the most important critical guiding and organising principle for success (notwithstanding its alignment to various other national development priorities).
- E. Data is king** - a seminal 2022 report from UNCTAD noted the absence of data as a critical disabler of, among other objectives, international trade in hemp. The absence of segregated, hemp-specific data more generally limits the extent to which an evidence base is credible and has implications on a wide range of sectoral activity including policy making, financing, traceability and market access, harmonisation and trade (including exports), standards and conformity or compliance, monitoring and evaluation etc.. From a policy making perspective, evidence-based decision making is critical for ensuring value for money of interventions and adaptation when required; it is also important for stimulating capital that unlocks bankable propositions. Digital tools, AI, and IOT and increasingly playing a greater role in optimising the efficiency of data collection, processing, analysis and reporting while reducing the burdens on state capacity.
- F. There is no quick fix** - hemp sector development requires the deployment of targeted, purposeful, and sequenced interventions over the long-term. France’s hemp sector (the 2<sup>nd</sup> largest globally) had near collapsed in the 1970s and it took nearly half a century of deliberate effort to re-build its global competitiveness. The results of these efforts have also required consistent review to ensure their relevance, adaptive learning and management, and agility in the face of market developments or exogenous shocks. Of course, the time to impact may be

accelerated through greater investment in interventions but what, where, or how should be informed by an Industrial Strategy.

- G. Private-sector led** - efforts to (re)legalise hemp as well as to implement value-creating activity have largely been private sector driven, especially farmers. Across global markets, the private sector plays an anchoring role in informing industrial policy and enablers implemented by their policy makers. It does not do this at the exclusion of government, however, but recognises the need to appropriately differentiate between, and allocate responsibilities across, different actors in hemp eco-systems. This approach tends to stimulate innovation and competition while ensuring both public good oversight to hold the private sector (and others) accountable and alignment with national development goals
- H. No one-size fits all** - finally, hemp is a nascent sector across most global markets in which it is traded. This is a function of global prohibition, of course, but since the early 20<sup>th</sup> century every country has advanced its own agenda and approach to industrial policy and development, often linked to distinct national priorities. South Africa, all stakeholders emphasise, must forge its own path to ensure a tailor-made industrial policy. Notably, it also means doing so by learning from others to draw good practice and avoid already known pitfalls. Despite the nuanced national approaches, a common feature among successful hemp markets appears to be an orientation towards “policy through action”, where policy is constantly refined in alignment to learning, new evidence, market developments, improving capabilities etc.

## II. Specific Lessons

Building on the more general, overarching lessons covered above, there are also specific lessons learnt from the global and local stakeholder engagements that have directly informed the core industrial policy enablers and recommendations and their associated tools and instruments.

### Lesson 1: Regulatory reform is the most important enabler for sector growth.

Notwithstanding full and formal decriminalisation of hemp, global lessons have consistently showed that clear regulatory differentiation between industrial hemp and psychoactive cannabis or CBD is the single most important factor for unlocking sector growth. In countries like the US and New Zealand, a failure to distinguish across applications (e.g. flowering material versus fibre and grain) has led to extensive red tape, impacted hemp’s investment proposition, and slowed commercialisation for specific applications. In contrast, Canada and France reformed early, which enabled them to treat industrial hemp as an agricultural commodity rather than a narcotic.

*“Certainty about regulations, that’s the most important enabler, and then the standard approach to help the development of an infant industry.” (Int 2; Global)*

Canada’s centralised licensing system (Health Canada) simplifies compliance for farmers and reduced barriers to entry dramatically. In these contexts, regulatory stability was cited as a key factor in building investor confidence, enabling long-term trace partnerships and facilitating and scaling the industry. For South Africa, regulatory ambiguity remains one of the biggest constraints on the investment proposition, and slow or mixed regulatory signals will continue to stifle commercialisation.

### Lesson 2: Finance and investment are decisive unlocks for hemp industrialisation

Hemp industrialisation cannot progress without an intentional finance and investment pillar that mobilises capital across the value chain. This pillar, notably absent from the current Masterplan, is essential to catalyse and build infant industries. Due to the nascency of the hemp sector, the engagements revealed that private and global investors remain cautious in the absence of regulatory

clarity, proven markets and reliable supply in South Africa. Local farmers resist scaling up without offtake certainty and affordable working capital and processors may not invest without guaranteed throughput. Countries that have managed to reduce risk and scale hemp have done so by deploying a suite of instruments (rather than isolated interventions), including using concessional debt, blended finance, grants, risk-sharing mechanisms, early-stage funding mechanisms and public procurement to accelerate value chain development and stimulate demand. Hemp financing structures are being shaped by sustainability agendas. Europe leads with tax incentives, green financing and material substitution rebates. Farmers in France receive cultivation incentives - which has sustained sector growth. In Brazil, public-private sector funding models are unlocking agricultural growth as banks increase rural lending, set minimum quotas and provide subsidies for low-carbon crops. Considering the above, hemp should be embedded within South African's green industrial policy and emphasis place on providing the appropriate suite of financing tools to attract private capital across the value chain for industrialisation.

### **Lesson 3: Commercialisation-orientated R&D is critical to build competitiveness**

Effective innovation and technology ecosystems drive competitiveness in many hemp sectors globally. Many leading countries sequenced their development by starting with low-complexity products and moving to higher-value applications (notwithstanding already existing national capabilities). Countries that lead in hemp do not only compete in cultivation and sequencing applications; they also compete through innovation systems, commercialisation-orientated R&D and technology transfer. Successful hemp markets have invested time and capital into seed genetics, agronomy, processing technologies and product innovation through strong triple-helix models which link government, universities and industry. China and France illustrate this clearly with long-term improvements in genetics and processing which have enabled high-value applications. The implication for South Africa is that hemp industrialisation needs a coordinated national R&D strategy centred on commercialisation and technology transfer across the demand pathways. South African has the relevant capabilities but efforts are fragmented and poorly integrated into an industrial agenda. A focussed R&D strategy should identify niche areas of comparative advantage, align research incentives to priority demand pathways and use demonstration to de-risk investment and promote great local and global networks of research.

### **Lesson 4: Spatial clustering and institutional coordination are essential for building a successful hemp ecosystem.**

Global hemp sector leaders use regional planning and spatial concentration as strategic tools. In both France and China, hemp cultivation is geographically concentrated and embedded within regional industrial strategies. France concentrates hemp production around two clusters that are supported by cooperative-style farming. China clusters production within two provinces and aggregates supply through large-scale processors. These regional approaches allow for effective backward and forward linkages, effective institutional and logistic arrangements. Associations, cooperatives and cluster organisations in these regions play cross-cutting roles in finance, research, technology and demand stimulation. They act as “knitters” of the value chain, organising growers and processors, setting specifications, facilitating certification and traceability, and representing the sector in policy processes. In South Africa, clustering and regionalisation is also central to feasibility along the value chain: where processing is located relative to cultivation

*“We brought together the public authorities, farmers, research centres and industry actors to tackle hemp 360 degrees.” (Int 3; France)*

determines transport costs, supply reliability, and investment consideration, particularly for bulky low-value feedstocks like hemp straw.

### **Lesson 5: Farmer-oriented (but not exclusive) industrial development**

Hemp farmers are the primary stakeholders who lend the sub-sector its distinctiveness. Stakeholders generally, and global stakeholders specifically, reinforced that successful sectoral development must be anchored on farmers, who provide the necessary raw materials for downstream use and generally bear the largest *hemp-specific* compliance burdens among value chain operators.

Any support and development intervention must be holistic, considering the various needs of farmers across inputs, skills, finance, market, information, technology, compliance etc. Among these, stakeholders noted “market access” as the most critical, given its outsized ability to unlock other requirements (including finance), followed by skills and technology (whether seed or equipment). Farmers, therefore, cannot be considered in isolation of the broader eco-system within which they operate, and not least given the dependencies between their backward and forward linkages. In South Africa, for example, the lack of mid-stream processing capabilities that provide farmers their immediate market was identified as a critical gap to unlocking cultivation at scale, along with its associated positive externalities. Local stakeholders particularly emphasised the links between farmer development and agro-industrial processing as levers for increasing value-addition and contributing to regional agri-industrial development akin to the comparative advantage South Africa already possesses in many other agricultural sub-sectors.

### **Lesson 6: Nascent sectors are generally high risk and require demonstration**

Given that hemp is a nascent sector, there are often many “unknowns” with regards to various factors that make a business case bankable or an industrial strategy competitive. These “unknowns” present several risks (whether real or perceived) including operational, financial, strategic, feasibility, climate etc. that must be managed to limit their likelihood and/or impact. Global stakeholders across new and developed “hemp” markets note “proof of concepts” (POCs) and “demonstration” as validated tools for both understanding and avoiding several risks. For example, while the CBD boom drove hemp industrialisation in the United States (a new hemp market), market rationalisation has forced a shift towards other plant parts, including fibres, a plant part with which the US had limited capability. Through triple-helix collabourlabourations, incremental small investments have meant failure happens fast, with limited adverse impact, and is productive in that it improves the evidence base and critically identifies where viability is unlikely and where with some iteration it may be improved before large-scale investments in industrialisation or commercialisation are made. Similarly, while France is a global leader in hemp fibres, generally its focus has been on short-fibres and used in a narrow set of applications. Over the last few decades, investment in PoCs across the hemp value chain are translating into material capital investment in the sector and improving competitive advantage in new areas of hemp fibre application (including bio-composites and clothing textiles). This approach builds confidence alongside capability through evidence and validation, while avoiding large sunk costs from uninformed “Big Bets”.

*“It all starts with the farmer - they need to win. The hemp ecosystem is complex and market dependent. They are the beginning of the value chain and need to make a living and be supported.”*

*(Int 3; France)*

## Lesson 7: Regional Integration and Export Orientation

While conventional wisdom would suggest that South Africa focus on serving domestic markets, insights from stakeholders and data suggest a greater focus on stimulating export opportunities. On the one hand, slow domestic growth means the local market has insufficient absorptive capacity to support the kind of scaled ambition currently contained in the Cannabis and Hemp Masterplan. On the other hand, global demand for hemp far exceeds its supply and international buyers are constantly seeking new sources of supply, particularly where their own supply is increasingly constrained due to, for example, land-use restrictions or climate change. Since hemp is a seasonal product and almost exclusively grown in the northern hemisphere, there are opportunities for counter-cyclical supply from places such as South Africa. Further, evidence suggests a trend towards “regionalisation” (particularly in the European Union, Asia, and the Americas) where multiple markets, usually within regional economic blocs, collaborate to both stimulate intra-market trade as well as to build regional competitiveness. Given both activity and interest in the southern Africa region (e.g., Malawi, Zimbabwe, Zambia, Lesotho, and recently Botswana), South Africa may consider efforts towards market access and stimulating more frictionless trade between these markets, leveraging its various agreements and blocs such SACU, SADC, COMESA, and now AfCFTA.

*“South Africa has got all the pieces, agriculture, manufacturing and research, you just need to align them. In relation to Malawi or Zambia South Africa could be an important processing base once regional supply is coordinated.”*  
(FDG 1; Malawi)

### 6.3. Industrial Policy Toolbox

---

Based on the lessons learned above, this sub-section focuses attention on identifying, defining, and recommending sets of instruments, measures, and recommendations in what is loosely call a hemp industrial policy tool box. While there are many ways to think of these, a simple distinction between “supply-side” and “demand-side” interventions is applied. This toolbox (see Figure 37 below) and its tools apply to several different applications, and their use must be appropriately tailored. In many cases, the sequencing of their deployment can also have material implications on the extent to which they are indeed enabling.

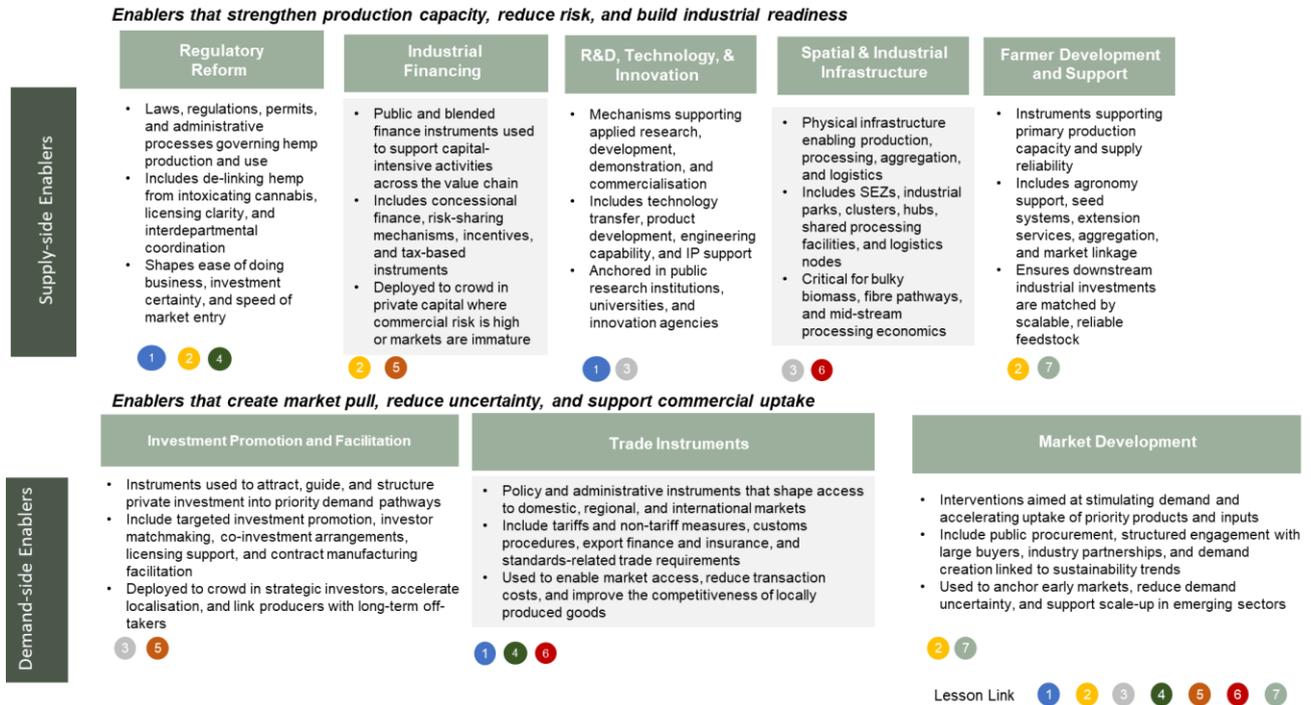


Figure 37: Industrial Policy Instruments<sup>155</sup>

Figure 37 frames the hemp industrial policy toolbox as a structured set of *enablers* that act on both sides of the market. On the **supply side**, the instruments strengthen production capacity, reduce risk, and build industrial readiness through six core levers: regulatory reform, industrial financing, R&D and innovation support, spatial and industrial infrastructure, and farmer development and inclusion. On the **demand side**, the instruments create market pull, reduce demand uncertainty, and support commercial uptake through three complementary levers: trade instruments, investment promotion and facilitation, and market development. Read together, the figure clarifies what each instrument *is* (in practical policy terms) and why it matters, while signalling that effectiveness depends on tailoring and sequencing these tools to the specific demand pathway and stage of sector development.

In this sub-section, and again given the absence of a guiding industrial strategy, these are offered as general requirements for enabling industrial development and specifically for stimulating future and further investment in the sector. It is structured into two parts

- 1) **Supply-Side Enablers** - review of supply-side enablers and associated recommendations
- 2) **Demand-Side Enablers** - review of demand-side enablers and associated recommendations

### 6.3.1. SUPPLY-SIDE ENABLERS

This section provides a focused review of the priority supply-side enablers identified during the discovery phase and during targeted interviews with legal, policy, development finance and

<sup>155</sup> Image source: Zageta Solutions, 2025.

procurement specialists. It sets out the enabling conditions South Africa need to strengthen to build productive capacity, reduce infant-industry risk factors and improve the industrial readiness. Each enable is contextualised within the broader industrial policy landscape and insights are translated into key enablers (what needs to be in place) and recommendations (how to implement them). This supply-side perspective begins with regulatory reform (decimalisation and market enabling regulations), followed by innovative financing instruments, R&D ecosystems, spatial planning and industrial infrastructure and farmer support and development mechanisms.

## I. Regulatory Reforms

Regulatory reform emerges from this study as the single most important enabling condition for hemp industrialisation in South Africa. Across engagements, regulatory clarity - particularly the formal distinction between industrial hemp and intoxicating cannabis - consistently determines investment, market formation and value-chain coordination at scale. In the absence of this clarity, all subsequent industrial enablers are severely constrained.

Despite incremental amendments to South Africa's cannabis related legal framework industrial hemp is still classified as a narcotic under the Drugs and Drug Trafficking Act.<sup>156</sup> Many stakeholders report that clarity on the differentiation (industrial hemp vs. intoxicating cannabis) is the most crucial need

*"Quality isn't determined visually... scientific standards matter. We need to understand what a well-retted hemp stalk looks like in South Africa before telling farmers how to produce it." (Industry*

to unlock commercialisation and industrialisation. This also includes the differentiation within hemp, between the grain/fibre components and the flowering parts. Regulatory reform has been slow, particularly for decriminalisation. These delayed responses and heightened ambiguity, combined with overlapping jurisdiction across the Medicines Act, the Plant Improvement Act, CfPPA and related agricultural and industrial regulations, has stifled investments, inflated compliance costs and created uncertainty across the value chain.

Hence, the sequencing of reforms is critical and market enabling regulations cannot function until legal segmentation is resolved.

While legal segmentation is a pre-requisite, regulatory reform cannot be address without a well-articulated industrial strategy. Hemp's multiple applications (5F framework) are governed by distinct technical standards, conformity requirements and market regulations.

As such, downstream regulatory frameworks need to be demand-pathway specific and sequenced alongside industrial development rather than imposed randomly or in a generic way. This implies two complementary tasks, firstly developing market-enabling standards and conformity systems across hemp subsectors (e.g. fibre grading systems, food safety protocols, building codes and environmental compliance). Secondly, regulatory intensity should be proportional to risk by enabling a 'light touch' from authorities for grain and fibre pathways. Stakeholders repeatedly highlighted that the current excessive regulatory burdens, particularly THC-testing regimes designed for psychoactive cannabis, are inappropriate for industrial hemp uses.

*"Grain and fibre pathways need the lightest touch from government...no routine THC testing burdens intended for cannabinoids" (Industry Expert)*

---

<sup>156</sup> Regulations for these are expected shortly but have not yet been, at the time of writing, formally gazetted, as required by law.

These regulatory reforms will give rise to specific enabling institutional arrangements, which are discussed in detailed in Section 6.5.

*“You need the private sector to help government develop an instrument for a fund-of-fund. This includes creating a fund for VCs to invest in this space... If we create it, they will come. They won't come if it's not there.” (Private fund manager)*

**Table 40: Regulatory Reform Key Enablers and Recommendations - Critical Tools, Measures and Actions**

| Key Enablers   | Recommendations - Critical Tools, Measures, Actions   |
|--|---|
| <b>Decriminalisation</b>   | Remove hemp from the Drugs Act and legally separate it from intoxicating cannabis. Redefine hemp as an industrial/agricultural commodity.   |
| <b>Guiding Industrial Strategy</b>   | Develop an industrial strategy that will inform enabling regulatory requirements. Assuming that regulations are segmented via demand pathways this strategy will involve exploring barriers, challenges, gaps and opportunities for the sector.   |
| <b>Permitting Process</b>  | Reconsider delegation of permitting authority to provinces, linked to zoning and other spatial considerations as well as “soft-infrastructure” (e.g. clusters etc.)<br>Reconsider permitting requirements related to max hectarage, fencing, and police inspections.  |
| <b>Market enabling regulations (e.g. standards, conformity, compliance etc.)</b> | Consider a separate “whole-hemp, all-uses” single legislation giving rise to a single regulatory authority with coordination responsibilities across functions, legislation, agencies etc. and providing strategic oversight.<br>Introduce clear technical standards across hemp subsectors using international standards as guidelines (e.g. ASTM) e.g. building codes, food safety protocols and ISO hemp fibre grades.<br>Expand conformity assessment capabilities and readiness, working alongside SABS and similar agencies |
| <b>Clear legal guidelines and coherent institutional coordination</b>            | Tighter coordination with a lighter touch from government predicated on having both primary and separate legislation.<br>Reconsider institutional arrangements under a single regulatory authority, currently under the DoA, for hemp grown for all purposes and in alignment with varying downstream compliance requirements (etc. GAP)  |

## II. Innovative Finance

The hemp sector currently faces significant finance and investment challenges due to a lack of clear sequenced and segmented approach. Private investors remain cautious given policy uncertainty and supply risks arising from the absence of midstream processing capacity, and without sufficient supply, the midstream is not viable. These risks can be addressed through regulatory reforms and stimulating downstream demand, which will strengthen the overall investment case of the value chain, including mid-stream processing. It is also critical that finance mechanisms are tailored to and aligned with the stage of the value chain (e.g. on-farm vs. downstream), the maturity of the businesses (e.g. early-stage vs. scale-up) and the chosen demand pathway (e.g. Foods vs Bio-fuels).

DFIs need to play a “crowding in” role, leveraging private capital and institutional investment through blended instruments and derisking first loss facilities. There are currently several financing instruments across DFIs like the IDC, NEF, Land Bank, and SEDFA which could provide hemp financing, but without the value chain focus and quantum required.

*“Right now, I can safely say we're doing very minimal and it's haphazard – it's not structured. To participate in a more structured drive would be of strong interest to the IDC. We want to lead, be at the centre of this”. (IDC representative)*

What is required is a structured Hemp Fund of Funds which can deliberately build the value chain over a 20-year period. This could be made up of multiple instruments depending on risk and return, including patient capital (for midstream processing), venture capital (for innovation-led scalable startups), blended finance (including grant funding where needed), equity finance, and ESD funding (for enterprise development and supplier development). Additionally, DFIs like the IDC have expressed willingness to participate and if appropriately structured, there are good prospects of leveraging green JET and ESG funding.

*“We can create ESG instruments for hemp, which makes it a lot more attractive... especially to raise capital from Europe where there’s a huge appetite. We can even bring in UNGC to promote it on our behalf once we’ve developed the instruments. The first time when we listed a green bond, I can tell you it was four times oversubscribed globally.” (Private fund manager)*

A hemp finance facility needs to be underpinned by capital readiness/project preparation/deal origination capability, managed through “Chinese Walls”. Technical Assistance could be leveraged through one of the multilaterals with which South Africa has a structured partnership contribution (like the AfDB).

This would enable the discovery and support of competitive early movers, and facilitate complex deal structuring across multiple state, institutional and private sector investors.

**Table 41: Innovative Finance Key Enablers and Recommendations - Critical Tools, Measures and Actions**

| Key enablers  | Recommendations - Critical Tools, Measures, Actions   |
|---|---|
| <b>Regulatory reform</b>                                    | Covered in detail in the section above, however without this enabler financing and early-stage derisking would be very difficult. This includes a guiding Industrial Strategy.  |
| <b>Investible pipeline (propositions and jockeys)</b>       | Develop project preparation capabilities (from deal origination to post-investment support), tailored to variety of project types, demand pathways, sizes, enterprises/entrepreneurs etc. Link capabilities to support de-risking efforts under a dedicated sector Fund (see more below) - including supporting PoCs and demonstrations<br>Explore integration of hemp entrepreneurs into existing incubation, acceleration, and ESD eco-system to leverage targeted support not only for proposition but also for the individuals tasked with implementing them.<br>Notably, ensure availability of credible market intelligence and general industry data to ensure decisions are informed by evidence. |
| <b>Appropriate instruments</b>                              | Map financing instruments (incentives, rebates, carbon taxes and credits)<br>Focus on extending existing or developing new early-stage financing instruments and incentives (grants, equity, green financing, concessional debt, procurement and ESD etc.)  |
| <b>Dedicated Industry / Sector Fund (of Funds of Funds)</b> | Mapping of finance players (VCs, DFIs, angel, carbon, ESG etc.) which is linked to size, sector and investment thesis.<br>Crowd in mapped finance players for shared-risk model e.g. blended finance.<br>Create a value-chain pooled finance structure that applies to stages of the value chain and business/proposition maturity.<br>Conduct state of readiness assessment with regards to existing technology capabilities and enabling requirements segmented by demand pathway.<br>Selection of and engagement with financiers and investors to assess interest and build foundations for appropriate proposition (including linked to other existing Funds whether for ESD or carbon)               |

### III. Research and Development: Technology and Innovation

South Africa has strong but fragmented research and innovation capabilities relevant to industrial hemp. There are proven capabilities in the natural fibre composites space, bio-based materials, agronomy and crop science as well as niche product development across food and agri-technology

domains. South Africa's research ecosystem has the relevant expertise but it is missing a single coordinated R&D innovation strategy that focuses on technology transfer and commercialisation. Global stakeholder evidence highlighted that successful hemp sector leverage strong innovation ecosystems through triple-helix models and state infrastructure (examples include the automotive industry in Germany and agri-biotech in Netherlands). These stakeholders also emphasised that the country's existing technology and innovation capabilities should be anchored locally in the triple-helix collaboration model as a starting base and then work to incorporate global technology and best practice.

*“My recommendation is to rather do a pilot processing plant. Start with the pilot... When you want to demonstrate the case for viability, you can start with a pilot plant because that will take you very, very far” (Private fund manager)*

The challenge is not one of a lack of capability, but of coordination, syndication and commercialisation-driven strategies and approaches to developing the R&D ecosystem. Currently, research in industrial hemp nationally remains ad hoc, under-funded and disconnected from a broader industrial strategy therefore limiting technology transfer (a critical enabler for industrialisation) and the potential to provide Proof of Concepts (PoCs) that are commercially scalable and globally competitive.

Linked to this, technology readiness is uneven across the value chain. Upstream cultivation knowledge is relatively mature, but farm-level processing remains at a small-scale. Midstream infrastructure, particularly decortication, scutching and extraction capacity remains severely constrained and it a structural bottleneck to scaling production if investment in industrial R&D cannot be unlocked. Downstream sectors such as textiles, construction materials and food have absorptive capacity but require specification development, standards validation and product innovation driven by commercial R&D.

As applied to the enablers above, addressing these gaps requires both a coordinated national strategy for hemp and a clear R&D and innovation strategy centred on commercialisation, technology transfer and demand pathway competitiveness. Without this and a deliberate effort to coordinate research institutions, industry actors and the state, South Africa risk remaining and importer of technology rather than a contributor to the global hemp research ecosystem.

**Table 42: R&D Key Enablers and Recommendations - Critical Tools, Measures and Actions**

| Key Enablers                                   | Recommendations - Critical Tools, Measures, Actions  |
|--|--|
| <p><b>Triple-helix collaboration model</b></p> | <ul style="list-style-type: none"> <li>• Map relevant research institutions, their capabilities along related areas relevant to prioritised demand pathways. There are examples of these efforts already happening at individual institutions (e.g. Nelson Mandela University) that may be replicated by others.</li> <li>• Develop a coordinated national hemp innovation strategy, but linked with localised capabilities in research institutions across provinces, working in clusters, and contributing to knowledge economy</li> <li>• Establish mechanisms for structuring cooperation or partnership models between parties, with a particular focus on supporting technology transfer of public research institutions.</li> <li>• Ensure linkages between R+D initiatives to piloting and commercialisation-oriented proofs of concepts and demonstrators for multiple propositions (see Finance Enabler) and ensuring constant feedback loops to stimulate continued innovation</li> </ul> |

|   |   |
|---|---|
|   | <ul style="list-style-type: none"> <li>• Leverage state research capabilities and infrastructure technology (e.g. CSIR, Coega etc.) but structure offerings and support programmes particularly for SMMEs, and especially where the costs of technology are prohibitively high and technical skills are scarce</li> </ul>   |
| <p><b>A strong agronomy and agricultural research evidence base</b></p> | <ul style="list-style-type: none"> <li>• Support adaptation trials to explore the performance (i.e., productivity) of various genetics (linked to end-uses) under varying agri-climatic conditions. This is critical in a diverse country like South Africa, with many micro-climates. Critically, this information - already collected by the ARC and others - must be made publicly available.</li> <li>• Support commercial trials to explore conditions for economic viability (alongside agronomic feasibility) and identify potential areas for intervention. Integrate results to update and refine the unit economic base this study provides along with its associated recommendations.</li> </ul> |
| <p><b>Industrial R&amp;D financing</b></p>                              | <ul style="list-style-type: none"> <li>• Extend the existing 150% R&amp;D tax deduction to hemp-sector innovation for industrial use development.</li> <li>• Stimulation of matching opportunities between R+D and markets - linked to Market Development activities</li> <li>• Consider international research collaborations and partnerships, particularly related to the green economy and decarbonisation and for which there is existing finance (e.g. EU Innovation Fund etc.)</li> </ul>  |

#### IV. Spatial and Industrial Infrastructure

Spatial referencing and industrial infrastructure planning is critical for hemp industrialisation and scaling up the industry. The geographical distribution of cultivation, processing and manufacturing needs to be strategically aligned to the demand pathways and value chain structure. Early clustering is emerging in the hemp cultivation landscape in Kwa-Zulu Natal (36% of permit holders), Gauteng (16%) and the Eastern Cape (14%). This activity is largely driven by informal farmer networks, the history of hemp in the provinces and private sector interest rather than through spatially anchored policy plans. The current cultivation patterns for hemp are not matched to a particular industrial strategy yet and there is no relation to processing hubs or agro-ecological suitability. The existing Master Plan makes no mention of spatial referencing which creates a challenge of disconnected growth, increased transport costs and inefficient linkages between primary production and midstream processing.

*“In France, seed multiplication only takes place in a certain region... so it's grown in the best conditions.” (Legal Expert)*

As highlighted Chapter 2, global best practice has shown that successful hemp-producing countries spatially concentrate hemp production and processing within at most two regions to improve logistics, develop clusters, and protect genetic integrity. In both China and France, hemp production is highly regionalised, and the benefits of co-located infrastructure, and of institutional management of environmental zoning and industrial planning, are evident.

*“Agric loses value on the road we must align processing with primary production spatially.” (DFI executive manager)*

The lessons globally also suggest that spatial clustering is not just logistics-based but also works toward cultivating place-based competitiveness. In South Africa, this spatial concentration can minimise transport losses, enable co-location of processing near growing areas, and bring together downstream manufacturing in industrial zones and hubs (SEZ and localised SPVs).

The Eastern Cape and KwaZulu-Natal have the potential to be key cultivation zones given their favourable climates and already existing agro-processing infrastructure. The missing element is the ‘knitting’ of actors and midstream/downstream infrastructural capabilities. KZN has the largest number of permitted farms while the EC shows high potential for large-scale plantations (highest proportion of 20ha+ farms). These provincial profiles show great localisation potential in the textiles, food processing and bio-based material value-chains.

Bottlenecks include a nationally centralised permit system and a misalignment between zoning and land-use processes. A coordinated spatial approach is needed to support vertically integrated development, streamline the permit system and unlock site-specific investment through clustering models.

**Table 43: Spatial and Industrial Infrastructure Key Enablers and Recommendations - Critical Tools, Measures and Actions**

| Key Enablers   | Recommendations - Critical Tools, Measures, Actions  |
|--|--|
| <b>Spatial referencing and industrial infrastructure</b> | <ul style="list-style-type: none"> <li>• Identify priority cultivation and industrialisation zones (EC, KZN, Gauteng and LP) based on climate, ecology, agricultural infrastructure and demand pathway alignment.</li> <li>• Use targeted spatial nodes to inform infrastructure planning, permit zoning and targeted incentives.</li> <li>• Co-locate processing facilities near primary production and transport hubs which will reduce logistical costs and post-harvest degradation.</li> <li>• Integrate hemp into SEZ, industrial parks, hubs and clusters through introducing hemp-designated zones.</li> <li>• Identify zones for hemp cultivation for phytoremediation, degraded soil rehabilitation, mine land rehabilitation according to ESG mandate and draw in mining sector capital into the hemp investment eco-system.</li> <li>• Leverage existing industrial zones including SEZs, IDZs, etc by providing common-use infrastructure for wide variety of end industries. Many of these already exist across South Africa, but they need to be linked to where farmers are (see spatial mapping in Chapter 2) to optimise backward and forward linkages.</li> </ul> |
| <b>Financial incentives</b>                              | <ul style="list-style-type: none"> <li>• Provide localised incentives and capex sharing facilities to attract early investment in manufacturing.</li> </ul>  |
| <b>Provincial and institutional coordination</b>         | <ul style="list-style-type: none"> <li>• Strengthen local institutional coordination through local SPVs (e.g. ECRDA) or cluster agencies to bring together farmers, processors and industry players.</li> </ul>  |
| <b>Spatial mapping and analysis</b>                      | <ul style="list-style-type: none"> <li>• Conduct spatial mapping and land suitability analysis e.g. geospatial mapping of existing hemp cultivation to better understand agricultural viability.</li> <li>• Build on the mapping of hemp permit holders by location and size of land (Chapter 2) to explore land use, climate suitability and variability, and linkages to other industrial infrastructure (roads, ports, SEZs, agri-hubs etc.).</li> </ul>  |

## V. Farmer Development and Support

Farmer (supplier) development and support, aligned with the requirements of downstream demand, is a critical enabler of value chain activity. Given confirmed local and global demand, associated interventions must address (though not fully solve on their own) the holistic or end-to-end needs of farmers to ensure that they are able to farm feasibly and viably and that their outputs are acceptable to their identified markets. According to local stakeholders engaged, while the South Africa government approach to industrialisation has largely been supply-driven - focused on permitting as

a tool for both decriminalising and stimulating economic activity - it has nevertheless been highly fragmented and does not satisfy the requirements of hemp permit holders/farmers. While a survey of the +1,700 hemp permit holders was not mobilised (as discussed in Chapter 2), insights from local hemp farming associations provided an understanding of farmer needs; furthermore, good practice was drawn from international markets to optimise success. Globally, it was found that while the focus (access to markets vs. inputs) and extent (light-touch) of, or even models (individual enterprise vs. cooperatives) associated with, hemp farmer support programmes varied by country they all nevertheless pursue a holistic approach and share 5 common features.

First, and notwithstanding the “right to operate” a permit provides, **access to market** is among the most critical given that it (i) incentivises the farmer to grow in the first instance, ensuring they reduce the risk of unsold inventory (ii) informs the farmers what they must grow the hemp for and the associated specifications of the output, ensuring appropriate production planning, (iii) de-risks the activity not only for them but also the associated credit risk to their financiers. For a farmer’s market is typically a primary processor, the existence thereof suggests a parallel focus on integrating these into existing capabilities or building these from scratch where they are missing. There is a need to align permitting arrangements with market development activities (see Market Development Enablers below)

Second, farmers require **access to** high quality, affordable, and accessible **inputs**. In Chapters 2 and 5 the seed requirement were discussed in some detail. The reliance on imported seed applies to all new market entrants whether in (South) Africa or Latin America, since more established markets (e.g. China or France/EU) also have established local seed sources, more accessible to their local farmers. Another key input to note is on-farm mechanisation, which significantly improves the efficiency and profitability of operations particularly for grain and straw (see Chapter 5). Since most agri-machinery is imported, there may be opportunities to explore support measures to improve access and reduce costs while also building local capabilities to fabricate. Finally, while hemp is largely grown under dryland conditions, access to water (including their associated rights) in water-stressed countries such as South Africa is critical and under-utilised infrastructure (e.g. irrigation schemes) may provide revitalisation opportunities.

Third, farming enterprises also require a range of **financing**. Among these, working capital for general operations and specifically for purchasing inputs appear to be most common. In addition to subsidies and incentives (by far the most common state-led tool, based on stakeholder feedback), there are examples of pre-financing by off-takers recovered through produce buy-back programmes and other underwriting mechanisms driven by private financiers and public agencies to improve access while reducing risk. Additionally, in more advanced hemp markets mechanisation is widely relied on to improve efficiencies and support by varying models (e.g. mechanisation as a service) including shared infrastructure for common use.

Fourth, farmers need adequate **skills as well as information** to enhance capabilities to make appropriately informed-choices and to maximise the productivity of their efforts. Many countries (outside of private provision) rely on public extension programmes, and their respective focus and efficacy vary by country. While South Africa private service providers have led the charge with offering accredited training to farmers, the public extension system provides little to no guidance on, for example, agronomic practices related to hemp. Additionally, other developed hemp markets combined technical extension with business and financial management support with the aim of building sustainable farming enterprises, whatever the scale. Similarly, farmers increasingly rely on

digital tools to access information and build “communities of practice” often times even beyond their borders; there is yet potential to leverage existing platforms to improve quality of and access to information.

Fifth, farmers also require **protection** against a range of perils and exogenous shocks that can adversely impact their enterprises and, particularly in developing nations as South Africa, their livelihoods. While not a major subject of analysis, insurance penetration in South Africa is among the highest globally with offerings tailored also to the farming enterprises, particularly grain crops grown on an industrial scale. Without insurance and price hedging mechanisms available to other agricultural sub-sectors, their absence for hemp farmers may subject them to various risks, especially related to climate change (e.g. droughts and floods). There are also examples of “bundling”, where insurance premiums, say, for inputs are factored into the total price of purchased inputs, although this practice appears less prominent in hemp-specific markets.

**Table 44: Farmer Development and Support Key Enablers and Recommendations**

| Key Enablers                     | Recommendations - Critical Tools, Measures, Actions   |
|----------------------------------|---|
| Access to Market                 | <ul style="list-style-type: none"> <li>• See Market Development enablers below</li> <li>• Work with other market development and support agencies such as the National Agriculture Marketing Council (NAMC)</li> <li>• Ensure programmes support range of different farmer types, focusing on building stronger linkages across and greater collaboration among them</li> </ul>   |
| Access to Inputs                 | <ul style="list-style-type: none"> <li>• Focus on seed and mechanisation as two key levers</li> <li>• For both, enable short-term access to inputs including with rebates, bulk procurement, and trade finance instruments etc.</li> <li>• Simultaneously support local initiatives for seed production and machinery fabrication</li> </ul>  |
| Access to Finance                | <ul style="list-style-type: none"> <li>• See Financing Enablers below for further discussion</li> <li>• Leverage existing initiatives including relatively new Blended Finance instrument offered by the Land Bank or national programmes including CASP, and tailored to hemp-specific requirements (e.g. much higher input cost)</li> </ul>   |
| Access to Skills and Information | <ul style="list-style-type: none"> <li>• Focus skills training initiatives working with the SETA’s and tertiary institutions (adjacent to Hubs and Clusters.)</li> <li>• Provide technical assistance to build production capacity to meet adherence to Compulsory Standards (Specifications of the National regulator for Compulsory Specifications)</li> <li>• Leverage Enterprise Supplier Development funds in targeted demand pathways.</li> </ul> |
| Access to Protection             | <ul style="list-style-type: none"> <li>• Engage with insurance providers to identify opportunities for extending existing product offerings to hemp sector or to develop new ones</li> </ul>  |
| Farmer-aligned intermediation    | <ul style="list-style-type: none"> <li>• Aggregation models</li> <li>• Engagement with large agro-industrial firms to encourage participation in aggregation systems.</li> <li>• Support for aggregation vehicles to “knit together” supply of inputs, technical assistance, access to finance, and market off-takes for small enterprises as part of broader hemp clustering initiatives.</li> </ul>   |

---

### 6.3.2 DEMAND-SIDE ENABLERS:

---

Typical demand-side measures include public procurement designations and off-sets; market activation and development through trade agreements and demand incentives; support for value

chain integration and strategic demand stimulation; deployment of tariff and non-tariff barriers; and rebates on imported machinery and intermediate inputs.

## VI. Market Development

Building market demand for hemp requires a value-chain approach. Demand in the downstream segments is the key that would unlock activity across all segments. Structured engagement is required with large-scale manufacturing firms across the prioritised demand pathways - textiles, wellness, construction, food & beverages, and pulp & paper - to assess the appetite and readiness for a shift to hemp-derived inputs.

These engagements need to discuss constraints and enablers, and how these can be prepared and facilitated. The core constraint for downstream manufacturers is steady supply which can be alleviated through rebates on imported inputs (see trade enablers below) while on-farm and mid-stream segments of the value chain are developed.

Market demand for manufactured products can be directly stimulated through state procurement, decarbonisation incentives, off-take commitments from large retailers, trade and export assistance (see trade section below), and consumer activation. Such engagements must be prioritised as part of the masterplan processes. The new Public Procurement Act provides an opportunity to use state markets strategically for innovation and industrialisation. Downstream demand pull creates a market for the mid-stream processed fibres, which in turn creates a guaranteed market for farmers, given that all demand pathways are fibre-based or dual-purpose.

*“Procurement is no longer just about price, competitiveness, and transparency, but brings in the development aspect. A quick win will be workwear, specifying a certain percentage to be made from hemp which can be increased over time. This will create huge demand. But we need to change procurement mindsets towards long term agreements, say 10 years. But do we have the capacity to manage 10 year phased projects?”*  
(Government Procurement Specialist)

**Table 45: Market Development Key Enablers and Recommendations**

| Key Enablers                                   | Recommendations - Critical Tools, Measures, Actions  |
|--|--|
| <b>Market access facilitation and linkages</b> | <ul style="list-style-type: none"> <li>• Structured engagements with stakeholders in identified priority downstream markets inform vertical coordination - link to decarbonisation agenda</li> <li>• Match-making activities focused on</li> <li>• Link to R+D commercialisation</li> </ul>  |
| <b>Export market stimulation</b>               | <ul style="list-style-type: none"> <li>• Stimulate export market demand through various trade agreements.</li> <li>• Focus on regional markets in SACU, SADC, COMESA or AfCFTA for the integration of hemp as a key product commodity.</li> <li>• May need to look at interventions to allow for enabled import of critical intermediate products while building local supply and capabilities over time.</li> </ul>   |
| <b>Public procurement</b>                      | <ul style="list-style-type: none"> <li>• Leverage public procurement mechanisms (e.g. local content) to stimulate demand. Crude localisation is not encouraged, and local content regulations cannot precede a proper industrial strategy and plan.</li> <li>• Ensure demand stimulation mechanisms are specific to demand pathway (e.g. substitute conventional fibre for school and military uniforms for hemp fibre or integrating hemp foods in public institutions).</li> </ul>                               |
| <b>Marketing</b>                               | <ul style="list-style-type: none"> <li>• Promote “Made in South Africa” hemp products and buy-local campaigns</li> <li>• Support designation of origin and provenance-based branding</li> <li>• Enable SMME market access through trade shows and buyer engagement platforms</li> <li>• Facilitate structured negotiations between producers and large buyers</li> <li>• Use coordinated communications and marketing platforms to normalise hemp as a mainstream agricultural and industrial commodity</li> </ul> |

## VII. Trade

Trade instruments are critical to achieving industrial policy outcomes, but only if there is clarity on the specific outcomes to be achieved. These include increased exports and penetration of strategic markets, import protection to enable infant industry growth, removal of trade barriers on capital and technology imports, and imported production inputs.

There are several factors constraining alignment of industrial and trade policy. The masterplan processes to date have largely neglected trade issues. Fortunately, this has changed, with ITAC now participating in the cannabis and hemp masterplan process, although this is still at very early stages. There is still much work ahead to clearly define the strategy for hemp industrialisation across the prioritised demand pathways and the value chain, as a prerequisite for the design of trade tools. This hemp industrialisation study should provide much of the evidence base for this.

The HS code classification for hemp (currently 3) has created tariff heading ambiguities, data tracking anomalies, and red tape in cross-border trade. Again, this is being addressed with UNCTAD to announce a more disaggregated set of hemp HS codes in 2026, for implementation in 2027.

And finally, the industry - being nascent - is not organised and lacks strong champions who can advocate for trade enablers. Based on the evidence assembled through this study, including stakeholder interviews, expert interviews and global practice, five sets of trade interventions are proposed which need to be carefully sequenced and segmented across the value chain.

*“It might be then that on the upstream or midstream product, you then begin to put kind of a protective framework of trade measures that allow for at least those who make the stuff locally to at least have a viable share of domestic demand. You don't want to invest and then kind of have your entire demand being gobbled up by imports” (Executive of SA Trade Body)*

**Table 46: Trade Key Enablers and Recommendations**

| Key Enablers   | Recommendations - Critical Tools, Measures, Actions  |
|--|--|
| <p><b>Short-term support for imported inputs</b></p>                       | <ul style="list-style-type: none"> <li>Engage with DTIC and ITAC to consider enabling trade measures particularly for products for which there is import reliance including seed, on-farm mechanization, processing (particularly those that are novel) and downstream infrastructure</li> <li>Similarly, consider enabling measures for imported intermediate inputs required for downstream manufacturing to stimulate downstream activity</li> <li>Consider timing of support measures to avoid crowding out investment in the building of competitive local capabilities and reducing import dependence.</li> </ul>  |
| <p><b>Cross-Border Trade Facilitation and Export Readiness Support</b></p> | <ul style="list-style-type: none"> <li>Linked to Trade Agreements (see below), engage with DIRCO, DTIC, National Treasury and related agencies to ensure integration of hemp into broader missions and market development</li> <li>Targeted investment promotion and matchmaking (contract manufacturing; licencing agreements; co-investment, technology transfer) in equipment manufacturing, and other mid-stream and down-stream industries)</li> <li>Leverage already existing export readiness support programmes (including incentives and finance) for processors and manufacturers, particularly as counter-cyclical supply and in alignment to requirements and standards</li> <li>Engage donor community and local agencies (embassies, trade missions, consulates etc.), many of whom express and demonstrate (e.g. French Hemp Mission to South Africa in 2024) interest in supporting cross-border collaboration and unlocking other support measures from their nations.</li> </ul> |

|   |   |
|---|---|
| <b>Standardisation and Harmonisation</b>          | <ul style="list-style-type: none"> <li>Engage with the National Treasury and DTIC to update to product classifications that are differentiated by hemp segments and to integrate these into the national system of accounts.</li> <li>Align classifications to forthcoming HS codes for hemp (expected in 2027) not only for trade but for data collection and management</li> <li>Align with partners in RECs to investigate options of adoption harmonized standards or establishing new ones through already existing processes under the International Standards Organisation (ISO).</li> </ul> |
| <b>Multi-later and Bilateral Trade Agreements</b> | <ul style="list-style-type: none"> <li>South Africa is already party to several bilateral and multilateral agreements that allow for preferential access to regional and international markets. New agreements either on the African continent or further East unlock new market opportunities for South African hemp businesses.</li> </ul>  |
| <b>Investment promotion</b>                       | <ul style="list-style-type: none"> <li>Engage with DIRCO and DTIC on measures for investment promotion to incentivise foreign direct investment (capital, tech, skills) and create an enable business environment including through sets of incentives (e.g. those already provided by SEZs/IDZs).</li> </ul>   |

In summary, this subsection outlines **33 enablers** and more than **80 tools, measures, instruments, and actions** that may be considered across the 8 supply and demand enablers identified. The same architecture in the Figure below is used to summarise the key aspects of the policy toolbox. The **supply-side recommendations** focus on: finalising legal separation and end-use-based regulation; deploying blended and concessional finance to crowd in private investment for capital-intensive processing; concentrating applied R&D on priority pathways and enabling midstream technology transfer; clustering production and processing through spatial and industrial infrastructure; and strengthening farmer development through aggregation, off-take models, and standards compliance. The **demand-side recommendations** align to the three demand levers: trade, investment promotion, and market development, reinforcing the principle that supply activation must be matched by deliberate demand formation to de-risk opportunities, stimulate innovation, and unlock impact at scale.

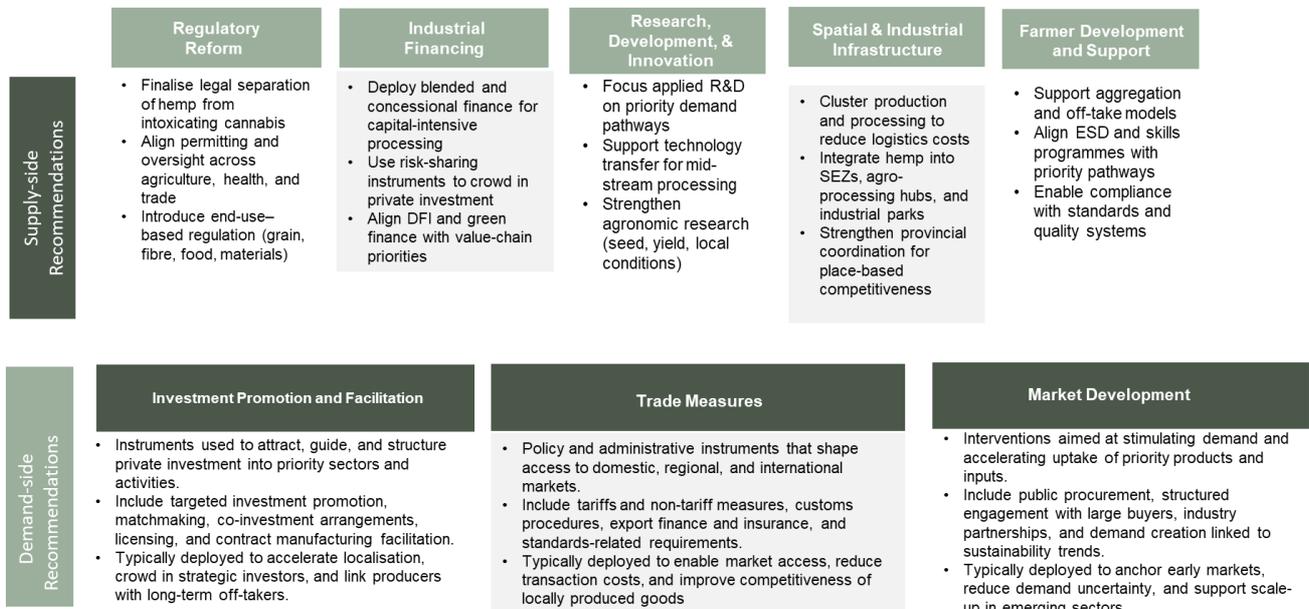


Figure 38: Summary of Industrial Policy Recommendations<sup>157</sup>

Given the breadth of these recommendations, section 6.5 introduces a “minimum programme of action” to guide policy-makers on key interventions, linked to the stage of overall sectoral/industry maturity. First, however, the institutional arrangements required to advance these recommendations are briefly discussed. It focuses on pragmatic efforts to support targeted and tighter coordination, but with a lighter touch.

## 6.4. Institutional Considerations

This Chapter would not be complete without some assessment, however brief, of the institutional arrangements currently established to manage the hemp sub-sector. The industrial toolbox outlined above require some institutional home (as well as processes, systems, resources etc.) in order to oversee, advance, monitor, review, and continuously revise the recommendations in alignment with a currently theoretical Industrial Strategy. Much like many other priority sectors, hemp in South Africa is governed by National Cannabis and Hemp Masterplan (CMP) document and process, led by the Department of Trade Industry and Competition, working alongside other key departments (Agriculture, Health, Justice, Small Business etc.) and “social partners” (representatives from Industry, Labour, and Community). The Masterplan rests on a methodology of, in its simplest form, facilitating reciprocal commitments among all these actors in pursuit of commonly identified and agreed sectoral goals. While the methodology is agnostic of sector, its application manifests differently with respect to hemp and these differences are briefly explored and some potential recommendations are provided. Although a review of institutional arrangements was not within the Study’s scope - and engagements with public sector partners were challenged - local stakeholders

<sup>157</sup> Image source: Zagea Solutions, 2025.

provided numerous insights regarding current institutional arrangements and which now inform these brief remarks.

- **Methodology not fit-purpose:** First, despite broad-based application to any sector, the methodology was, as the authors understand, designed specifically for established sectors given various implicit assumptions (e.g., mature industry, validated evidence base, clearly established interests, existing capabilities particularly within the state) that often do not hold true for nascent industries, including hemp (understood as distinct from dagga, a plant with much longer roots in South African history). The methodology has not been tailored the specific requirements of a new hemp sector nor even as distinct from those of intoxicating cannabis.
- **Process-driven approach encumbered by many structures:** Second, the Masterplan methodology itself has been implemented differently by each sector, lending to differing institutional arrangements. For example, Masterplans typically comprise an “executive” layer including a “Reference Group” with representation from social partners and an “oversight” layer called a Executive Oversight Committee (EOC) led by a designated Minister and also comprised of broad-based representatives. In many cases, Masterplans have also incorporated additional arrangements including project management units, responsible for technical, operational, coordination, implementation oversight, monitoring and evaluation and secretarial functions. The CMP does not have an EOC and accountability rests with an Inter-Ministerial Committee (IMC) comprised of only government officials. Further, the CMP has several layers including an IMC (oversight, ratification, dispute resolution), a Steering Committee (executive), a project management unit (largely secretarial and, ostensibly, coordination of 8 departments) all at a national level but ostensibly linked to provincial structures. This has led to a process-oriented, rather than an action and outcomes-oriented approach, with evidently little demonstrable impact relative to the 5-year investment already made.
- **Hemp and dagga not differentiated:** Third, the CMP assumes exactly the same requirements for intoxicating cannabis (including medical cannabis, legal in South Africa since 2018) and hemp and provides identical institutional arrangements. The DTIC is the lead department understandably given its role in a demand-led industrial strategy, but it has no legislative oversight on hemp (governed by Department of Agriculture), nor on medical cannabis (governed by the Department of Health), or private-use cannabis (governed by the Department of Justice). This lack of segmentation for the purposes of industrialisation and commercialisation is limiting (as already described in this Report) and also places strain on the state to coordinate multiple and often conflicting stakeholders and interests. It is perhaps particularly confusing since once the CfPPA is passed, all consequent “secondary” legislation requiring amendment is already segmented by hemp vs. dagga and by hemp’s end use (e.g. regulations for animal feeds vs. building codes for construction).
- **Quality of evidence base challenged:** Fourth, the quality of the CMP and associated Commercialisation Policy reflects the absence of a credible evidence base. In its earliest form, stakeholders noted that “industrial hemp” was described as non-viable in South Africa and offered little prospect or pathway for commercialisation. Additionally, the lack of a demand-oriented and holistic strategic imperative has translated into indiscriminate lists of actions without the appreciation of their linkages and interdependencies and the capabilities or capacities required to implement them. Further, since the CMP document was authored

exclusively by government (which suffers from information asymmetry), there may be a need to consider more meaningful co-creation based on evidence rather than simply ambition.

Based on this brief assessment, potential considerations for policy makers are proposed (notwithstanding that institutional arrangements should, like enablers and tools, also be informed by the Industrial Strategy):

**1) Reimagine a Masterplan methodology tailored to hemp's needs:** The Masterplan process is an entrenched industrial policy methodology in South Africa and it is unlikely to change. Given that its application can differ by sector, it therefore follows that absent its core principles it can be reimagined as needed. Under this circumstance, policy makers may consider several options.

- a. First, making a clear distinction between a Masterplan for hemp vs. one for intoxicating cannabis, aligned to the forthcoming regulatory architecture where the two are separated both in terms of right to operate but also in terms of enabling downstream use and trade.
- b. Second, updating the evidence based informing the Hemp "Masterplan" and defining a clear Industrial Hemp Sector Strategy. This provides a guide, which can be reviewed periodically.
- c. Third, and based on that strategy, reviewing the appropriateness and efficacy of current institutional structures (IMC, SteerCo, Provincial, PMU) and associated processes for hemp policy development and making revisions accordingly.
- d. Fourth, aligning with social partners, including on reciprocal commitments and new arrangements.
- e. Five, based on the above, establish (currently absent) operationalisation and implementation oversight arrangements, drawing on expert, lean, and agile capabilities from all social partners (see more below).

**2) Simplify and decentralise structures and delegate to regional authorities:** Hemp (as distinct from dagga) fundamentally requires the coordination of only two key departments: DTIC (as the lead department and home of largest suite of industrial enablers relevant to hemp) and the DoA (as regulator of on-farm and upstream activities). Similar examples include the Sugar and Poultry sectors, which while they both form part of South Africa's agricultural economy are governed principally by the DTIC, working alongside the DoA. Indeed these are also the two sectors within the agricultural sector that have own Masterplans despite the existence of a National Agriculture and Agri-Processing Masterplan (AAMP). This is not to suggest that other Departments are not important, but that it should be clear which departments are "core" and which are "supporting" - and with clearly defined decision rights or equivalent accountability framework - such that structures established and the efficiency of their processes are not encumbered by the need to coordinate multiple parties across many spans of government.

Second, consider the appropriate delegation of authorities between national and provincial spheres of government. The current centralised model places significant strain on capacity at national level, which stakeholder feedback suggests, leads to inefficiencies and bottlenecks. It also tends to miss local opportunities, where stakeholders operate, and often its tools are too far away or inflexible to location-specific needs. Policy makers may consider separating strategic and oversight functions sitting at national, for example, from day-to-day operational or technical ones (permitting, zoning, enterprise or farmer support, investment promotion etc), such that resources are most efficiently and effectively allocated. While the DTIC's institutional arrangements are more

fragmented at provincial level,<sup>158</sup> the DoA has clear provincial structures with concurrent functions to their national counterpart and that can be leveraged in this instance.

- 3) Mainstream hemp into other industry platforms:** As discussed extensively, demand for hemp comes for a wide variety of downstream sectors ranging from food and beverages to automotive composites. In South Africa, several of these already have established institutional arrangements including separate Masterplans (e.g. Automotive, Clothing and Textiles, Forestry, Furniture, Agriculture etc.). To the authors knowledge, there have not yet been efforts to align and integrate the CMP's ambitions with those of downstream demand, even though objectives such as livelihood creation, decarbonisation, diversification, and localisation are common across these sectors and hemp could play an important part in each. This is not to suggest that collaboration does not happen across sectors but that policy makers may play a greater role in facilitating more of this both intentionally and outside of process-oriented systems.<sup>159</sup> This mainstreaming of hemp into other Masterplans requires more intentional and dedicated effort and the aligning or economising of scope between Masterplans may stimulate collaboration and partnership and lead to improved efficiency in delivery and effectiveness of outcomes. The responsibility for this rests whatever structure of entity selected (see above discussion).
- 4) Consider empowering other or new and different arrangements:** Despite historical prohibition and what stakeholders describe as slow regulatory reform, emerging "clusters" of triple-helix models being implemented in almost every province across South Africa but particularly in KZN and the Eastern Cape have been noted, as well as in Gauteng and Limpopo. These clusters are anchored on private sector partners who collaborate with an eco-system of geographically proximate (though not isolated) other actors to meet a set of aligned goals. They are running pilots, developing supply chains, partnering on innovation, facilitating technology transfer, and raising capital for propositions across many demand pathways. In all of these arrangements, local governments (including their agencies) are included in initiatives and play varying roles (e.g. permit support, early stage concessional finance, input provision, training etc.), but all of which are enabling and supporting rather than leading. This is not dissimilar to experiences from similarly developing and established hemp markets globally, who rely on this "soft enabling infrastructure" to drive sector development "where the action happens".

According to stakeholders engaged, South Africa already has precedent in explicit support for "cluster development" (e.g. through DTIC incentives) and the public enablement of similar private sector-led "soft infrastructure" to build competitiveness (e.g. soy sub-sector). These localised institutional arrangements prevent inertia in view of regulatory confusion and uncertainty, refocuses state attention to targeted enabling and oversight functions while reducing the burden on its centralised capacity, and provide the feedback learning loops to continually inform and refine the

---

<sup>158</sup> Since DTIC's provincial equivalents are provincial departments of economic development, which are almost never "standalone" departments and instead are combined with other departments (e.g. fisheries or tourism) variably by province.

<sup>159</sup> There was previously a quarterly Masterplan steering committee with all sectoral Masterplan representatives led by the Project Management Office in the Presidency and with support from the DPME. Unfortunately, given its intention was largely to monitor progress and to escalate challenges for resolution, it provided little platform for cross-sectoral engagement.

industrial strategy. These form levers of competitiveness in advanced hemp markets globally, and their appropriate application to a South African context may yet yield similar results.

Following this discussion on reimagining institutional arrangements, and the other on the industrial policy toolbox, the focus now shifts to translating sets of recommendations into a “minimum programme of action”.

## 6.5. Industrialisation Roadmap

South Africa’s hemp sector is expected to evolve progressively over time, shaped by existing capabilities, institutional conditions, and the sequencing of enabling interventions. This industrialisation roadmap is intended to guide expectation-setting across stakeholders rather than prescribe a fixed implementation plan, recognising that actual trajectories will be influenced by policy choices, market dynamics, and investment behaviour. The roadmap is framed around a stylised industry lifecycle, moving from early-stage market formation through growth and maturity, and extending into a phase of renewal beyond maturity. Each phase reflects a shift in emphasis: from establishing foundational building blocks and proving feasibility, to scaling and replication, to consolidation and competitiveness. As maturity is reached, the sector does not plateau or decline; instead, outcomes in the maturity phase create the conditions for renewal through ongoing innovation, upgrading, and adaptation.

Framed in this way, the roadmap highlights how earlier investments in capability, coordination, and institutional alignment compound over time, allowing hemp to transition from an emerging opportunity into a resilient, competitive component of South Africa’s agro-industrial economy.

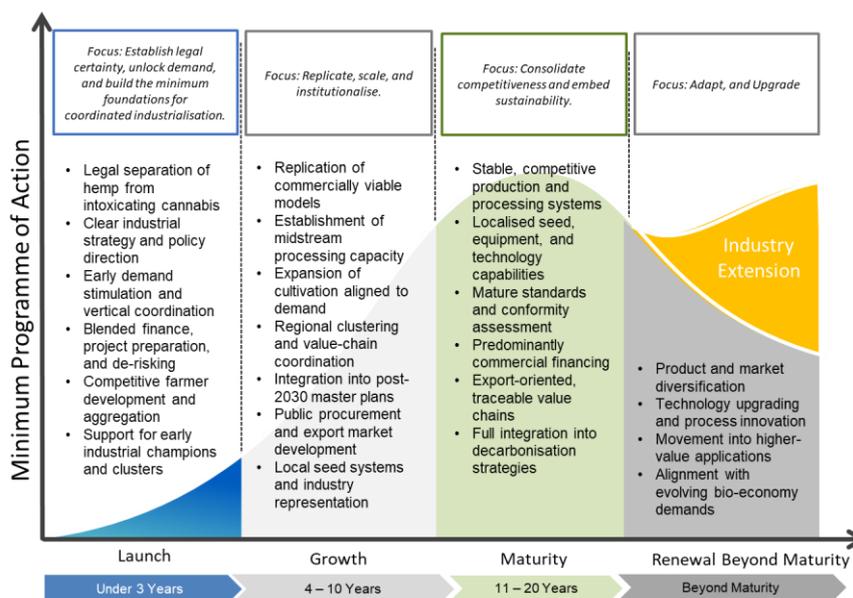


Figure 39: Hemp Industrial Lifecycle Roadmap<sup>160</sup>

<sup>160</sup> Image source: Zageta Solutions, 2025.

## Launch / Early Stage (e.g. up to 3 years)

The short term is decisive for whether hemp industrialisation in South Africa moves beyond fragmented activity into a coordinated industrial trajectory. Rather than pursuing a broad set of interventions, the evidence from this study points to five priority focus areas that cut across all lessons and enablers identified. Together, these constitute a minimum programme of action for the first three years:

- **First, formally separate hemp from intoxicating cannabis and establish a clear industrial strategy:** Hemp must be unequivocally differentiated in law, policy, and administration and treated as an agricultural and industrial commodity. This separation should be accompanied by a clear industrial strategy for hemp, potentially supported by dedicated legislation or a formal policy framework, to remove regulatory ambiguity and provide a stable foundation for investment and coordination. Focus on building and validating data and evidence, with a bias for action.
- **Second, aggressively stimulate/develop markets to enable vertical coordination and capability formation in the supply chain:** Early industrialisation must be driven by demand. This requires active market stimulation focused on vertical coordination between farmers, processors, and manufacturers, while deliberately building missing capabilities, particularly in mid-stream processing. Time-bound incentives, procurement levers, and support for downstream pilots are critical to create reliable demand signals that pull the value chain. In the first instance, focus on structured engagements with output markets and buyers across identified priority demand pathways. And simultaneously explore short-term measures for enabling access to imported goods (seeds, agri-machinery, processing and manufacturing equipment).
- **Third, develop a coherent financing plan for the sector:** A dedicated hemp financing architecture is required, anchored in a sector-focused fund and complemented by a suite of blended finance instruments aligned to business maturity, venture stage, and end-use markets. This must include structured de-risking mechanisms such as project preparation, deal origination, and pre- and post-investment technical support to crowd in private and institutional capital, especially for “missing middle”, mid-stream processing.
- **Fourth, enable competitive farmer development aligned to market requirements:** Farmer support must shift from permitting-led participation to competitiveness-led inclusion. Priority should be given to three pillars: secure market access through aggregation and offtake arrangements; access to appropriate finance, including working capital and equipment; and targeted skills development aligned to specific demand pathways and quality requirements.
- **Fifth, support emerging industrial champions and clustering initiatives:** Targeted support should be provided to existing and emerging industrial champions with demonstrated capabilities, particularly those operating through clustering and aggregation models. These actors play a critical role in anchoring demand, coordinating supply, and accelerating learning-by-doing in a nascent sector.

By the end of this phase, South Africa is expected to have regulatory clarity, a refined strategic framework, early mover projects, and foundational partnerships in place, creating the conditions for replication and scale.

### **Growth Phase (e.g., 4 to 10+ years): Replication and Scale Formation**

The growth phase is defined by disciplined replication rather than expansion into new directions. Building on the foundations established in the early phase, the focus shifts to scaling only those cultivation, processing, and manufacturing models that have demonstrated commercial and institutional viability. The central objective during this period is to move from isolated pilots to coordinated value-chain activity, with cultivation volumes expanding strictly in line with downstream demand.

This phase prioritises the establishment of midstream processing capacity and the strengthening of vertical coordination between farmers, processors, manufacturers, and buyers. Aggregation and regional clustering become increasingly important, improving logistics efficiency, supply reliability, and cost competitiveness. Institutional arrangements also begin to consolidate, with hemp progressively embedded within industrial and agricultural policy frameworks through its inclusion in post-2030 master plans and sector strategies.

Demand formation mechanisms mature during this phase, supported by targeted government procurement, structured offtake arrangements, and the negotiation of regional, continental, and international export agreements. The founding of a representative industry body supports coordination, advocacy, and standard-setting, while the development of a localised seed bank strengthens supply resilience and reduces import dependence.

Innovation and skills development deepen through the activation of the triple-helix model, linking research institutions, industry, and government around applied research, technology transfer, and workforce development. By the end of this phase, hemp is expected to function as a recognised agro-industrial input within selected downstream sectors, characterised by increasing localisation, improving competitiveness, and credible access to regional and export markets.

### **Maturity and Renewal: Consolidation, Competitiveness, and Long-Term Adaptation**

As the sector progresses beyond the growth phase, the importance of early prioritisation becomes fully apparent. By concentrating initial effort on a limited set of demand pathways, capabilities, and institutional reforms, the industry enters maturity with coherence rather than fragmentation. Hemp transitions into a stable and competitive component of South Africa's agro-processing and manufacturing economy, characterised by predictable production systems, embedded standards and conformity assessment, and commercially viable mid-stream and downstream operations. Financing increasingly shifts toward commercial instruments as risk profiles stabilise and demand becomes more reliable, while hemp production and manufacturing are integrated into district-level planning and broader industrial and agricultural frameworks. Over the longer term, the sector's trajectory is shaped less by continued expansion and more by its capacity for renewal. Some applications may mature or face substitution, but the foundations laid through disciplined sequencing enable ongoing innovation, upgrading, and adaptation to evolving sustainability, decarbonisation, and bio-economy requirements. In this way, prioritisation in the early and growth phases does not constrain the sector's future; rather, it creates the conditions for durability, flexibility, and long-term industrial relevance.

## 6.6. Concluding Thoughts on Hemp Industrialisation

---

This chapter has demonstrated that while South Africa does not yet possess a coherent industrial strategy for hemp, the evidence assembled across this study clearly indicates that the sector holds both economic and developmental promise. The challenge is therefore not one of potential, but of enablement. Hemp remains a nascent industry, operating in a fragmented regulatory, institutional, and investment environment, and its successful industrialisation will depend on the deliberate sequencing and alignment of policy instruments rather than isolated or reactive interventions.

A central finding of this chapter is that industrial enablers cannot substitute for strategic direction. In the absence of a clearly articulated hemp industrial strategy, the tools and instruments outlined here should be understood as minimum enabling conditions rather than a comprehensive plan. Their effectiveness will ultimately depend on how well they are coordinated, prioritised, and embedded within a broader set of strategic choices concerning demand pathways, spatial focus, institutional responsibilities, and inclusion objectives. Without such alignment, there is a real risk that well-intentioned interventions will dilute impact, misallocate scarce resources, or inadvertently raise costs and uncertainty for investors and producers alike.

The lessons drawn from global and local engagements reinforce several recurring themes. Regulatory clarity, particularly the clear separation of industrial hemp from intoxicating cannabis, emerges as the foundational enabler upon which all others rest. Finance and investment are decisive, but only when deployed through structured, shared-risk instruments that recognise the realities of an infant industry. Innovation and research must be oriented toward commercialisation rather than isolated technical advancement, while spatial clustering and institutional coordination are essential to overcoming logistics constraints and unlocking scale. Across all pathways, demand-led value chain development, supported by credible data systems and demonstration projects, is critical to building confidence and sustaining momentum.

Importantly, the chapter also underscores that hemp industrialisation is neither quick nor linear. International experience shows that competitiveness is built over decades through consistent policy attention, adaptive learning, and iterative refinement. While South Africa can accelerate this trajectory by leveraging existing agro-industrial capabilities and global demand shifts toward low-carbon materials, success will still require patience, discipline, and realistic expectations. The private sector must play a leading role in innovation and execution, but this depends on the state providing a stable, coherent, and enabling environment.

Hence, sequencing is critical. The Minimum Programme of Action includes (1) legally separating hemp from psychoactive cannabis (and CBD) so that it is treated like any other agricultural commodity; (2) aggressively stimulate the market to focus on vertical coordination including critically building missing capabilities; (3) provide support to existing and emerging industrial champions and initiatives, particularly those focused on clustering and with demonstrated capabilities; (4) develop a finance plan for the sector including a Hemp Fund and several blended-instruments linked to business maturity, value chain stage and end-use market (5) enable competitive farmer development with a focus on market access, finance and skills as key pillars.

Institutionally, the current configuration of the Cannabis and Hemp Masterplan presents both opportunities and limitations. While it provides a platform for coordination, its methodology and

structures are not well suited to the distinct requirements of a nascent industrial hemp sector. The lack of differentiation between hemp and intoxicating cannabis, the absence of a strong evidence base, and the highly centralised, process-heavy governance arrangements have constrained progress to date. It is important to not only rely on government to lead industrialisation, private sector actors and investors need to be including to share the risk and build capacity. Addressing these shortcomings will require re-imagining how hemp is positioned within existing industrial policy frameworks, simplifying oversight arrangements, and empowering regional and sector-specific implementation mechanisms.

In sum, this chapter situates industrial enablers not as prescriptive solutions, but as building blocks. Together, they provide a practical basis for moving from evidence to action, while recognising that trade-offs, sequencing, and institutional reform must ultimately be guided by a clear strategic imperative. If aligned with South Africa's broader objectives of diversification, decarbonisation, and inclusive growth, and implemented with discipline and coherence, these enablers can help translate hemp's theoretical potential into tangible industrial outcomes.

# Conclusion

---

The study set out to build the evidence base for the industrialisation of hemp in South Africa, exploring the extent to which there is a business case for investment in the sector, specifically around four core questions:

1. **First, is there a market (or addressable market) for South African hemp locally and globally?** What is the shape and size of the market, how is it growing, what's driving it, how competitive it is, and which segments or Demand Pathways are most attractive?
2. **Second, is there a net positive tangible return to be made from hemp?** Understood as financial and non-financial returns including ROE, IRR or Social ROI (jobs, diversification, inclusion, decarbonisation etc.)?
3. **Third, is it feasible to execute?** Understood as the requisite enablers/capabilities such as skills, capacity, technology etc., across value chain activities and operating environment including hard and soft infrastructure, finance and investment, logistics, regulations and standards at the sectoral (and adjacent) level. Are these in place to ensure South Africa can do so competitively?
4. **And fourth, if so, then how?** What is the broad suite of industrial policy tools and instruments with supporting institutional arrangements needed to facilitate, catalyse, enhance, support, or enable the identified opportunities?

Notably, it is hoped that while such a study contributes to informing direction towards strategic choice and planning, this Study is not a bankability assessment for investment opportunities, and readers are urged to take cognisance of this. Instead, it aims to establish and consolidate a foundational evidence base - building on the efforts of others - that bridges the knowledge asymmetry between policy makers and sector operators and that ultimately provides an approach for how to answer these key questions.

The study finds that the global industrial hemp market is expected to grow at a compound average growth rate of above 17% over the next 7 years, growing from a market value of \$10 billion in 2025 to about \$37 billion by 2032, driven in the main by decarbonisation imperatives, near-shoring, and innovation in new materials.

Severe data limitations and restrictive assumptions notwithstanding, a conservative market sizing exercise estimates potential hemp demand in South Africa at R7.3 billion in 2024, growing to R17.7 billion by 2030 and R40.4 billion by 2040 with the development of production capabilities, cost efficiencies, new technologies, and decarbonisation demands.

South Africa is well positioned to leverage this potential market due to its climatic and counter-seasonal advantages, on-farm cost advantages, strategic gateway position for intra-Africa trade, and significant agro-industrial and other downstream manufacturing capabilities which could be mobilised for hemp industrialisation.

But the country lacks a clear industrial strategy for hemp industrialisation, and policy support for the sector remains fragmented and underwhelming.

This study provides the evidence base for course correction and points to the strategic choices which need to be made to enable hemp industrialisation. It demonstrates that hemp is not just an agricultural commodity but a multi-use industrial input capable of supporting diversification, localisation, and green industrialisation across several sectors, confirming close alignment with Government's industrial policy objectives.

Through a mixed-methods approach - integrating a demand-led value chain assessment, economic complexity analysis, frontier product identification, global and domestic demand assessments, and qualitative evaluation - the report highlights where South Africa's most feasible and high-value opportunities in the hemp value chain lie.

The findings show that while hemp's potential is broad, the immediate and most impactful opportunities for hemp industrialisation are concentrated in a narrower set of demand pathways where technological feasibility, market pull, and domestic capability align. These include personal care, general textiles, clothing textiles, pulp and paper, food and beverages, and building and construction, each presenting distinct entry points for industrial growth, diversification and upgrading depending on end-use type, biomass component, and capability requirements.

Two of these demand pathways - Food and Beverages and Personal Care - require input feedstock primarily from hemp grain-derived oils, with the other four - General Textiles, Clothing Textiles, Pulp and Paper, and Building and Construction - requiring hemp straw. To validate the case for hemp industrialisation across these demand pathways, unit economic analysis was applied to establish the viability of primary cultivation and the primary processing of hemp straw. Importantly, the study confirmed that hemp cultivation in South Africa is commercially viable, but very dependent on the purpose of the crop as well as the scale of production and level of mechanisation.

Similarly, the Processing Unit Economic Analysis found processing straw in South Africa to be a viable proposition, but only if operators can secure markets and, critically, supply can be scaled relatively quickly. The study notes the investment and local value capture opportunities presented by cultivation and processing, given the preference of downstream manufacturers for local sourcing. But only if the chicken and egg problem - where farmers won't grow without market, and processors won't invest without guaranteed supply - is resolved.

What is required is coherent industrial strategy, public sector will, and clear signalling to the private sector whose markets and capital will determine the pace and scale of hemp industrialisation.

This is the evidence from countries which have built up competitive hemp value chains. Regulatory reforms, especially the clear separation of industrial hemp from intoxicating cannabis, is the foundational enabler. There are other critical enablers. A clear strategy to sequentially build productive capabilities across the value chain. Centrally coordinated regulation with a light touch. Shared risk-instruments that leverage private sector investment. Investment in innovation and support for pilot projects and commercialisation. Spatial clustering. Institutional mechanisms for the private sector to continually interface with government.

International experience also shows that hemp competitiveness requires value chain co-ordination and integration which is built over many decades. In the absence of a hemp industrial strategy, and in recognition of South Africa's poor track record in infant industry support and limits of the current Cannabis Masterplan, the study calls for realistic expectations.

Prioritisation and sequencing are critical. Critical short-term outcomes to be realised over the next 3 years - the “minimum programme of action” - include:

- Separating hemp from intoxicating cannabis as an agricultural and industrial commodity, differentiated in law, policy, and administration.
- Co-creating markets enable vertical coordination and capability formation in the supply chain and addressing missing capabilities in mid-stream processing.
- Developing a dedicated hemp financing facility, with a suite of blended finance instruments aligned to business maturity, venture stage, and end-use markets, and with de-risking mechanisms such as project preparation and deal origination capabilities for early mover and demonstration projects.
- Enabling farmer development to secure market access through aggregation, offtake arrangements, and supply-side support.
- Developing a clear hemp industrial strategy and revamped masterplan with new and innovative institutional arrangements to activate downstream industry champions in targeted demand pathways, and large agro-industrial firms for value chain development and integration, as well as clustering and aggregation at sub-national levels.

Success in achieving these outcomes will lay the platform for the development over the next decade and more, of what could be a highly innovative and globally competitive hemp agro-industrial complex capable of contributing significantly to the country’s diversification, decarbonisation, and inclusive growth ambitions.

It is hoped that this study will, despite its limitations and in its own modest way, contribute to making this a reality.

# References

---

- Agricultural Research Council (ARC). (2021). Breeding and seed development report: Hemp varieties in South Africa. Pretoria, South Africa. Retrieved from <https://www.arc.agric.za/>
- AgriFutures Australia. (2024, May 21). Emerging industrial hemp industry thrives with AgriFutures Australia's support. Retrieved October 13, 2025, from <https://agrifutures.com.au/news/emerging-industrial-hemp-industry-thrives-with-agrifutures-australias-support/>
- Amaral Filho, J., Bhorat, H., Harrison, S., Hill, R., Rumjeet, S., & Steenkamp, F. (2024). The biorefinery as a pathway to building economic complexity in the post-mine landscape. Development Policy Research Unit, University of Cape Town.
- Bhorat, H., Ewinyu, A., Lilenstein, K., Rooney, C., Steenkamp, F., & Thornton, A. (2019). Economic complexity and employment expansion: The case of South Africa (DPRU Working Paper 201905). Development Policy Research Unit.
- Blouw, Langa Sunshine. (2012). Effect of cultivar on the quality of flax and hemp grown in South Africa. PhD Thesis. Nelson Mandela University (NMU).
- Blueprint 2023: Hemp and Cannabis Sector Development - Situational and Value-Chain Analysis. (2023). Situational analysis - Final report. Department of Trade, Industry and Competition.
- Broadhurst, J., Chimbanga, T., & Hangone, G. (2019). Identification and review of downstream options for the recovery of value from fibre producing plants: Hemp, kenaf and bamboo (MtM DSI-NRF CoP/WP201903). Development Policy Research Unit.
- Bugnacki, N. (2020). China: A Rising CBD Superpower [Review of China: A Rising CBD Superpower]. Arcview Market Research in Partnership with Asia Horizon. <https://arcviewgroup.com/wp-content/uploads/2022/03/China-A-Rising-CBD-Superpower-2020-Whitepaper.pdf>
- Callaway, J. C. (2004). "Hempseed as a Nutritional Resource." *Euphytica*, 140, 65-72.
- CannaBusiness Plans. (2024, June 12). The global hemp market: Trends, forecasts, and opportunities. Retrieved October 13, 2025, from <https://cannabusinessplans.com/global-hemp-market/>
- Cherney, J. H., & Small, E. (2016). Industrial hemp in North America. *Agronomy Journal*, 108(1), 1-19.
- Claas Southern Africa. (2023). Harvesting & processing equipment catalogue. Hamburg, Germany / Pretoria, South Africa. Retrieved from <https://www.claas-group.com/>
- Clarke, R. C. & Merlin, M. D. (2013). *Cannabis: Evolution and Ethnobotany*. University of California Press.
- Council for Scientific and Industrial Research (CSIR). (2019). Hemp and cannabis value chain opportunities in South Africa. Pretoria, South Africa. Retrieved from <https://www.csir.co.za/>
- Council for Scientific and Industrial Research (CSIR). (2020). Hemp fibres and bio-composites research reports. Pretoria, South Africa. Retrieved from <https://www.csir.co.za/>
- DAFF (Department of Agriculture, Forestry & Fisheries). (2016). *Hemp trials and research overview*.
- Data Bridge Market Research (2020): Global Industrial Hemp Market. Industry Trends and Forecast top 2032.
- Data Bridge Market Research. (2024). Global hemp-based foods market: Industry trends and forecast to 2031. Retrieved October 13, 2025, from <https://www.databridgemarketresearch.com/reports/global-hemp-based-foods-market>
- Deitch, R. (2003). *Hemp: American History Revisited*. Algora Publishing.
- Department of Agriculture, Land Reform and Rural Development (DALRRD). (2021). *Hemp Permit Guidelines*. Pretoria: South African Government.

Department of Trade, Industry and Competition (DTIC). (2020). Poultry Masterplan. Pretoria, South Africa. Retrieved from <https://www.thedtic.gov.za/>

Department of Trade, Industry and Competition (DTIC). (2021). South African Cannabis Masterplan. Pretoria, South Africa. Retrieved from <https://www.thedtic.gov.za/>

Department of Trade, Industry and Competition (DTIC). (2018). Geared for Growth. South Africa's Automotive Industry Master Plan to 2035.

Department of Trade, Industry and Competition (DTIC). (2021). Retail-Clothing Textile Footwear Leather (R-CTFL) Value Chain Masterplan. Pretoria, South Africa.

DNA Economics. (2023). An analysis and proposal for a financing framework for the hemp and cannabis sector. Hemp and Cannabis Phakisa Action Lab. Workstream 2 and 3 presentation. 19 - 23 June 2023.

European Commission. (2023). *EU Catalogue of Varieties of Hemp - THC Threshold Regulations*. Brussels: Directorate-General for Agriculture and Rural Development.

Food and Agriculture Organization of the United Nations (FAO). (2020). Carbon sequestration potential of industrial hemp. Rome, Italy. Retrieved from <https://www.fao.org/home/en/>

Food and Agriculture Organization of the United Nations. (n.d.). FAOSTAT: Land use - QCL. Retrieved October 15, 2025, from <https://www.fao.org/faostat/en/#data/QCL>

Gaulier, G., & Zignago, S. (2010). BACI: International trade database at the product-level (1994-2007) (CEPII Working Paper No. 2010-23).

Grand View Research. (2023). Industrial hemp market size, share & trends analysis report, by product, by application, regional outlook, 2024-2030. Retrieved October 13, 2025, from <https://www.grandviewresearch.com/industry-analysis/industrial-hemp-market>

Grand View Research. (2024). Industrial hemp market size, share & trends analysis report by source (conventional, organic), by product (seeds, fiber, shives), by application (animal care, textiles, automotive), by region, and segment forecasts, 2024-2030. Retrieved October 13, 2025, from <https://www.grandviewresearch.com/industry-analysis/industrial-hemp-market>

Hausmann, R., & Chauvin, J. (2015). Moving to the adjacent possible: Discovering paths for export diversification in Rwanda (CID Working Paper No. 294). Harvard University.

Hausmann, R., Hidalgo, C. A., Bustos, S., Coscia, M., Simoes, A., & Yildirim, M. A. (2014). The atlas of economic complexity: Mapping paths to prosperity. MIT Press.

Hemp Today. (2025). Hemp industry SWOT analysis 2025. Hemp Today Research Series.

Hemp Today. (2025). Hemp textile industry report.

Hemp Today. (2025). North American hemp fibre processing report 2025. Hemp Today Research Series.

HempConnect GmbH. (2023). Carbon in hemp explained.

Hemp Today. (2025). Hemp industry SWOT analysis 2025.

Hidalgo, C. A. (2021). Economic complexity theory and applications. *Nature Reviews Physics*, 3(2), 92-113. <https://doi.org/10.1038/s42254-020-00275-1>

Hidalgo, C. A., Klinger, B., Barabási, A.-L., & Hausmann, R. (2007). The product space conditions the development of nations. *Science*, 317(5837), 482-487. <https://doi.org/10.1126/science.1144581>

Hidalgo, C. A., & Hausmann, R. (2009). The building blocks of economic complexity. *Proceedings of the National Academy of Sciences*, 106(26), 10570-10575. <https://doi.org/10.1073/pnas.0900943106>

IndustryARC. (2023, November). Industrial hemp market - Forecast (2024-2030). Retrieved October 13, 2025, from <https://www.industryarc.com/Research/Industrial-Hemp-Market-Research-503518>

Intergovernmental Panel on Climate Change (IPCC). (2021). AR6 Climate Change 2021: Mitigation pathways. Geneva, Switzerland. Retrieved from <https://www.ipcc.ch/report/ar6/>

International Chamber of Commerce (ICC). (2021). Voluntary carbon market integrity guide. Paris, France. Retrieved from <https://iccwbo.org/publication/icc-voluntary-carbon-market-integrity-guide/>

- Irawan, A., Mattila, P., Mäkinen, S., & others. (2025). Use of industrial hemp byproducts in ruminants: A review. PMC. Retrieved from <https://www.ncbi.nlm.nih.gov/articles/PMC12076842/>
- John Deere South Africa. (2023). Agricultural machinery product catalogue. Johannesburg, South Africa. Retrieved from <https://www.deere.africa/en/>
- Kaur, G., et al. (2023). The sustainability of industrial hemp: A literature review. *Sustainability*, 15(8), 6457. <https://doi.org/10.3390/su15086457>
- Kavex South Africa. (2022). Sprayers & implements catalogue. Bloemfontein, South Africa. Retrieved from <https://www.kavex.co.za/>
- Khanal, Asmita & Shah, Ajay (2024): Techno-Economic Analysis of Hemp Production, Logistics and Processing in the U.S.
- Li, H.-L. (1974). "The Origin and Use of Hemp in East Asia." *Economic Botany*, 28(4), 304-313.
- MarketsandMarkets. (2024, May). Industrial hemp market worth \$32.5 billion by 2030. Retrieved October 13, 2025, from <https://www.marketsandmarkets.com/PressReleases/industrial-hemp.asp>
- MarketsandMarkets. (2025). Industrial hemp market by type (hemp seed, hemp seed oil, CBD hemp oil, hemp bast, hemp hurd), source (conventional, organic), application (food & beverages, textiles, pharmaceuticals, personal care products) - global forecast to 2029. Retrieved October 13, 2025, from <https://www.marketsandmarkets.com/Market-Reports/industrial-hemp-market-84188417.html>
- Mechoulam, R., & Gaoni, Y. (1965). The identification of cannabinoids. *Journal of the American Chemical Society*, 87(14), 3273-3275.
- Medicines Control Council (MCC). (1997-2017). *Research Permit Records for Cannabis Cultivation Trials*. Pretoria.
- Mills, E. (2021). *Industrial Hemp: Global Market and Regulatory Transitions*. OECD Working Paper Series.
- MSR Plans. (2023). Africa hemp research report: Market analysis, opportunities, and strategic insights. Retrieved October 13, 2025, from [https://msrplans.com/Africa\\_Hemp\\_Research\\_Report.pdf](https://msrplans.com/Africa_Hemp_Research_Report.pdf)
- National Agricultural Marketing Council (NAMC). (2022). Market trends and outlook for industrial crops in South Africa. Pretoria, South Africa. Retrieved from <https://www.namc.co.za/>
- National Agricultural Marketing Council (NAMC). (2025). Input costs monitoring: An update on selected items (March 2025).
- New Frontier Data. (2019). The Africa regional hemp & cannabis report: 2019 industry outlook.
- Pinfold Consulting. (2001). *Industrial Hemp: Environmental and Economic Benefits*. Cape Town.
- Riddlestone, S. & Forster, S. (2012). *Bast Fibre Crops: Environmental Performance and Industrial Applications*. Biobased Materials Institute.
- Rolim, L. (2023, October 3). Hemp in Latin America: A sustainable solution for the bioeconomy? [Presentation slides]. United Nations Conference on Trade and Development (UNCTAD). Retrieved October 13, 2025, from [https://unctad.org/system/files/non-official-document/UNCTAD-Lorenzo\\_Rolim-Latin\\_America\\_Hemp.pdf](https://unctad.org/system/files/non-official-document/UNCTAD-Lorenzo_Rolim-Latin_America_Hemp.pdf)
- South African Health Products Regulatory Authority (SAHPRA). (2020). *Medicines and Related Substances Act: Amendment Notices*. Pretoria.
- Sasol. (2021). Biofuels and renewable chemicals programme. Johannesburg, South Africa. Retrieved from <https://www.sasol.com/>
- Sessions, J., Berry, M., & Han, H.-S. (2021). Machine rate estimates and equipment utilization: A modified approach. <https://crojfe.com/site/assets/files/4601/sessions.pdf>
- South African National Seed Organisation (SANSOR). (2022). Seed industry insights report. Pretoria, South Africa. Retrieved from <https://sansor.org/>
- South African Department of Health. (2020). Regulatory amendments on cannabis and hemp.
- South African Government. (2024). Cannabis for Private Purposes Act. Pretoria.

Small, E. (2015). Evolution and classification of Cannabis sativa L. University of Ottawa.

Small, E. (1979). The Species Problem in Cannabis: Science & Semantics. Ottawa: Agriculture Canada.

Statistics South Africa. (2025a). Retail trade sales (Preliminary): July 2025 (Statistical Release P6242.1).

Statistics South Africa. (2025b). Manufacturing: Production and sales (Preliminary): July 2025 (Statistical Release P3041.2).

Tersia Bugan. (2024, November 27). THC % Limits to Increase Tenfold to 2% Under DTIC's New Hemp Plan - Medigrow ZA. Medigrow ZA - Formal Network of Legal African Cannabis Growers. <https://www.medigrow.co.za/news/thc-limits-to-increase-tenfold-to-2-under-dtics-new-hemp-plan/>

Towards FnB. (n.d.). Industrial hemp market. <https://www.towardsfnb.com/insights/industrial-hemp-market>

United Nations Conference on Trade and Development (UNCTAD).(2022). Commodities at a Glance. Special Issue on Industrial Hemp.

United Nations Conference on Trade and Development (UNCTAD).(2024). Measuring global exports of Industrial Hemp products. Insights from national product classifications.

United States Department of Agriculture. (2025). National hemp report (Released April 17, 2025).

U.S. Congress. (2018). Agriculture Improvement Act of 2018 ("Farm Bill"). Washington, D.C.

UN Single Convention on Narcotic Drugs. (1961). United Nations.

United Nations Office on Drugs and Crime (UNODC). (2019). Cannabis: A Short Review of its History and Regulation. Vienna.

Venture Taranaki. (2021). Hemp blueprint: A guide to New Zealand's industrial hemp sector. Retrieved October 13, 2025, from <https://www.venture.org.nz/assets/Uploads/Hemp-Blueprint-Final-v2.pdf>

Van der Werf, H. (1994). "Crop Physiology and Applications of Hemp." *Agricultural Reviews*, 16(2), 109-121.

Wang, K., Xie, W., Wu, W., Pei, J., & Zhou, Q. (2020). Blockchain-enabled Internet of Things platform for end-to-end industrial hemp supply chain. arXiv. <https://arxiv.org/abs/2008.04998>

Yano, H. (2023). Hemp: A sustainable plant with high industrial value. PMC. Retrieved from <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9913960/>

Zion Market Research. (2023). Industrial hemp market by type (hemp seed, hemp fibre, and hemp seed oil), by application (food, beverages, personal care products, and textiles), and by region: Global industry perspective, comprehensive analysis, and forecast, 2024-2030. Retrieved October 13, 2025, from <https://www.zionmarketresearch.com/report/industrial-hemp-market>



PROUDLY SUPPORTING LOCAL INDUSTRY

Prepared by Zageta Solutions

