



The growth of South Africa's agtech sector and opportunities for agricultural drone applications



This brief is written for:



INVESTORS

Interested in understanding the landscape for agtech opportunities in South Africa, with specific reference to the business case for drones in agriculture.



INDUSTRY STAKEHOLDERS

Interested in understanding the South African agtech sector and opportunities for economically viable drone solutions.



Main insights

1

Agricultural technology (agtech) is a growing market in South Africa as farmers seek to improve productivity and resilience to climate change, whilst reducing input costs across the agricultural value chain. Agtech refers broadly to the technology and innovations applied to agriculture, such as hardware (drones, sensors, robotics), software (artificial intelligence (AI), data analytics), and biotech (genetically modified crops, soil microbes).

2

Whilst these innovations have seen significant uptake in recent years, barriers to the wider technology adoption remain, including difficulty accessing finance for demonstrating and piloting, and a lack of technology awareness and resistance to change by farmers. To address these barriers, a stronger collaboration between agtech companies, financiers, industry associations and government entities is necessary to create a thriving ecosystem that supports agtech innovation and adaptation.

3

The current market in South Africa for one of agtech's leading innovations, drones, is currently over R1 billion, which is forecast to more than triple over the next 5 years. There is therefore significant market demand and growth expected for agricultural drones but some use cases are far more mature and economically viable, whilst others require further demonstration to prove their viability.



1

Context

Agricultural technology (agtech) refers broadly to the technology and innovations applied to **agriculture**, such as hardware (**drones, sensors, robotics**), software (**AI, data analytics**), and **biotech** (**genetically modified crops, soil microbes**).

This includes a range of technologies that help farmers optimise crop yields, reduce resource usage, and improve overall farm management. As such, agtech is gaining traction due to the need to address various challenges in agriculture, including water scarcity, climate change and increasing weather volatility, soil degradation, more stringent regulations and the need to increase food production for a growing population.

South Africa has a diverse agricultural sector, ranging from large commercial farms to smallholder farmers, and agtech solutions are being tailored to meet the needs of both. However, there are a number of challenges that have been identified, which result in limited investments into the agtech sector in the country.

These challenges include:

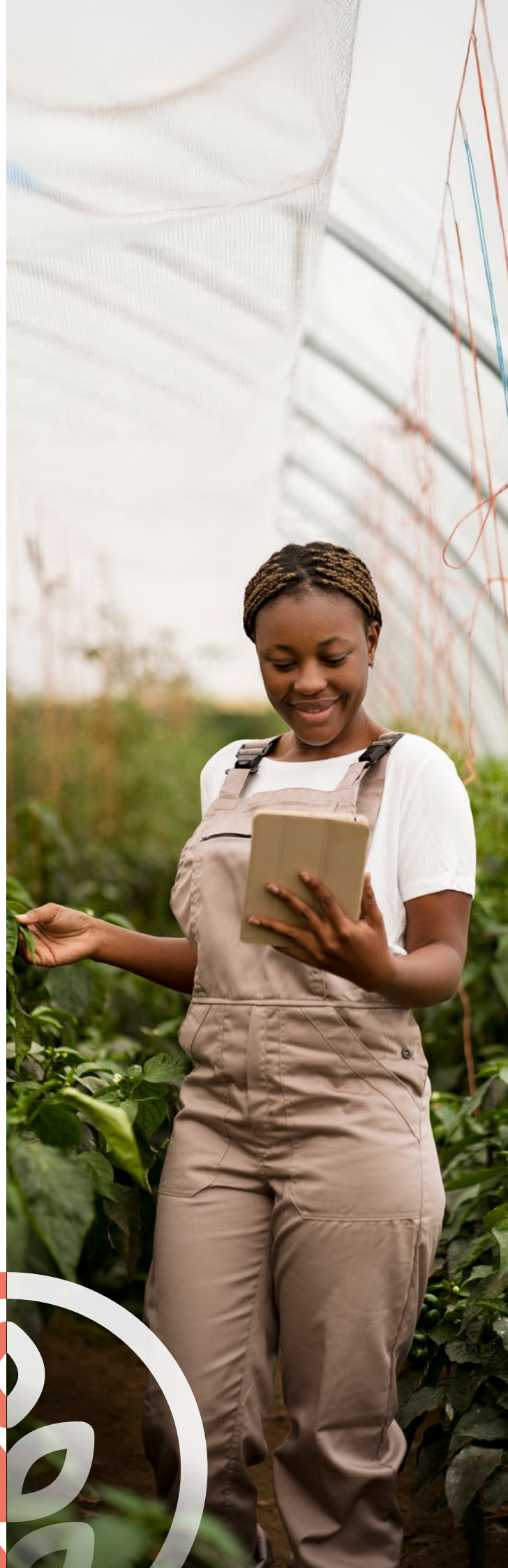
- a lack of business case understanding,
- a lack of financing mechanisms for scaling agtech companies, and
- a lack of sustained demand for agtech due to a lack of knowledge by farmers on the benefits of the available product offerings.

In September 2024, GreenCape gathered key stakeholders in the agtech sector including companies, financiers, and industry associations to unpack the challenges and explore growth opportunities within the sector. This event highlighted that agtech investment is still lagging, particularly for early stage start-ups. This growing industry requires patient funding for continuous research and development (R&D), market penetration activities and further testing, which may not necessarily align with the current finance product offerings. The critical role of R&D in advancing the agtech industry was emphasized, as R&D initiatives are key to driving innovation and developing technology solutions that meet the specific needs of the local agricultural sector.

Although R&D work is being undertaken by several industry associations to improve resilience and productivity, there is a need to build a robust pipeline of agtech projects, from the initial idea through to market-ready solutions. Collaboration between agtech companies, research institutions, and investors was identified as crucial to streamline and accelerate project development. Finally, it was noted that integrating agtech into farming operations remains a challenge due to resistance to change from farmers, limited digital skills, and concerns about the costs associated with implementing new technologies.

However, demonstrating the potential long-term savings, improved resilience and increased yields can help convince farmers of the value in adopting agtech innovations.

With these insights in mind, this industry brief aims to share key insights from market research and stakeholder engagements to highlight the business case for investing in agtech.



2

Overview of agtech in South Africa

Agriculture is undergoing many changes in response to climate change, policy environment, consumer preferences and the need to maintain global competitiveness. Agtech has been identified as one of key innovations which can help agriculture meet its targets and respond to adverse climate change. Agtech is classified into six major categories (see Table 1), which are believed to offer promising solutions for enhanced productivity, sustainability and resilience of the agricultural sector.

Table 1: Categories of agtech¹

TECHNOLOGY	DESCRIPTION
Farm management	Startups assisting farmers in managing, organising and optimising all of the tasks on their farm, with data capturing devices or decision support software.
Agriculture marketplaces	Startups working on B2B e-commerce marketplaces for farmers (with products ranging from seeds to equipment).
Farm robotics	Startups providing farmers with robots to replace or complement humans for challenging jobs.
Ag-biotech	Startups innovating on living systems and organisms for agriculture (notably crops) and health.
Indoor and novel farms	Startups developing urban and indoor farms to reduce the distance between production and consumption, increase yields, quality and sustainability.
Animal feed	Startups innovating on living systems and organisms for animal feed (usually with insects).



¹ <https://www.digitalfoodlab.com/foodtech/>

2.1 Potential benefits of agtech

Agtech offers great potential to revolutionize agriculture in South Africa. By leveraging advanced technologies, farmers can **enhance productivity, ensure sustainability, and increase competitiveness in export markets**. Some of the benefits of agtech include:

Improved resource management

- **Water efficiency:** Technologies, such as precision irrigation systems and soil moisture sensors, help farmers optimise water use, which is critical in South Africa, a water-scarce country.
- **Reduced fertilizer and pesticide use:** Precision farming tools enable targeted application of fertilizers and pesticides, reducing waste and environmental impact while enhancing crop health.

Data-driven decision making

- **Big data analytics:** Collecting and analysing large volumes of agricultural data helps in making informed decisions about planting schedules, crop rotation, and resource allocation, improving overall farm management.
- **AI and machine learning:** These technologies can predict crop performance, identify potential issues early, and recommend optimal farming practices, enhancing productivity and reducing risks.

Enhanced crop yields and quality

- **Precision agriculture:** Utilising GPS and remote sensing technologies, farmers can monitor crop health, soil conditions, and weather patterns in real-time, allowing for timely interventions and better yield management.
- **Genetic engineering:** Advances in biotechnology, including genetically modified crops, can improve resistance to pests, diseases, and extreme weather, leading to higher yields and better quality produce.

Labour efficiency and cost reduction

- **Automation and robotics:** Automated machinery and drones can perform labour-intensive tasks such as planting, harvesting, and monitoring, reducing labour costs and increasing operational efficiency.
- **Supply chain optimisation:** Internet of Things (IoT) and block chain technologies improve traceability and transparency in the supply chain, reducing losses and enhancing market access for farmers.



3 Diving into drones

One of the most vibrant sub-sectors of agtech is the application of drones or unmanned aerial vehicles (UAVs) for various activities on farms. Below are listed the key applications for drones on farms, but this is not an exhaustive list as innovation in this sector continues to find new use cases

3.1 Agricultural drone use cases and associated benefits

Field monitoring and surveillance: *Real-time field analysis using high-resolution cameras. Uses multispectral and thermal imaging to analyse soil moisture, plant stress, and possible pest outbreaks.*

- Detects plant health issues (diseases, nutrient deficiencies, water stress)
- Identifies pest infestations before they spread.
- Helps optimise irrigation and fertilization schedules
- Reduces labour costs for farm audits

Precision spraying & spreading:² *Sprays pesticides, herbicides, fertilizers, and beneficial pest with high accuracy.*

- Variable rate spraying allows for targeted application, reducing the overall amount (thus cost) of inputs
- Reduces chemical waste and environmental impact.
- Covers large areas faster than manual methods, such as tractors or manned spraying
- Lower health and safety concerns in comparison to other spraying options.

Farm security, livestock and wildlife monitoring: *Tracks herd movement and detects sick or missing animals.*

- Counting and locating the herd
- Monitors grazing patterns and identifies overgrazed areas.
- Helps scare off wild animals damaging crops.
- Detects trespassers, poachers, and crop thieves.

Crop planting and pollination: *Dispersal of seeds in hard-to-reach areas.*

- Speeds up the planting process, thereby reducing labour costs
- Drones can operate in hard-to-reach areas, such as steep slopes or wetlands, where traditional machinery struggles
- Reduces soil compaction, unlike tractors
- Experimental AI-driven pollination drones help in areas lacking bees.

Yield prediction and data collection: *AI-powered drones estimate harvest potential based on crop health data.*

- Provides valuable insights for farm planning such as the refining of harvest timing and resource allocation
- Informs market decisions and can support cost reductions in marketing efforts as they can be planned earlier



2 Refer to the 2025 Sustainable Agriculture Market Intelligence Report for more details on precision spraying, which was identified as a significant opportunity: <https://greencape.co.za/market-intelligence/>

3.2 Drone business case by application

In South Africa, much of the agricultural drone growth to date has been in field monitoring and surveillance and associated data analytics, with precision spraying and yield prediction seeing strong growth in recent years whilst crop planting is still at an early adoption phase.

Market revenue estimates for drones in agriculture in South Africa are approximately R1 billion in 2024,³ with this forecast to grow to over R3 billion by 2030. This macro level analysis indicates significant investment opportunity, with the more granular view providing a clearer indication of the business case fundamentals.

USE CASE	BUSINESS CASE FUNDAMENTALS ⁴	TYPICAL BUSINESS MODELS
Field Monitoring and Surveillance	<ul style="list-style-type: none"> • Cost range: R300/ha – R500/ha • 15% increase in water efficiency⁵ • 10% reduction in crop loss⁶ • 20 – 30% reduction in pesticides and chemical costs⁷ 	Typically delivered as a service, according to seasonal or ad hoc requirements (such as a farm audit)
Precision Spraying and Spreading	<ul style="list-style-type: none"> • Cost range: R250/ha – R800/ha • Minimum viable size 10 hectares. • 20% reduction in fertiliser and a 9% increase in yield⁸. • 20% reduction in pesticide usage⁹ 	Delivered as a service, according to seasonal requirements
Crop planting	<ul style="list-style-type: none"> • 85% reduction in planting costs¹⁰. • Most effective for cover and grain crops 	No current operators known in South Africa
Livestock monitoring	<ul style="list-style-type: none"> • Labour Cost Reduction (20-40%)¹¹ • Drone cost is between R800,000 - R1.5 million depending on the size, cameras, equipment 	A few operators in SA, predominantly as hardware sales
Yield prediction and data analytics	<ul style="list-style-type: none"> • Cost range: R3k/ha – R10k/ha • Minimum viable size 60 hectares • 15-25% increase in realisable yields and reduction in input costs 	Software licensing and consulting packages

Of the 106 registered drone operators¹² in South Africa, 34 provide imaging services in the agricultural sector (i.e. largely in field monitoring and surveillance, with some in the livestock monitoring space), and 14 offer precision spraying services. These companies are headquartered across South Africa, with significant representation in Gauteng (approximately 44%) which likely service the surrounding provinces, followed by the Western Cape.

3 <https://www.grandviewresearch.com/horizon/outlook/agriculture-drones-market/south-africa>

4 The figures included are largely indicative and are sourced from local and international case studies. Further investigations are required to develop more accurate estimates

5 https://www.researchgate.net/publication/385172035_Drones_in_Agriculture_Revolutionizing_Crop_Monitoring_and_Spraying

6 https://www.researchgate.net/publication/385172035_Drones_in_Agriculture_Revolutionizing_Crop_Monitoring_and_Spraying

7 https://www.researchgate.net/publication/385172035_Drones_in_Agriculture_Revolutionizing_Crop_Monitoring_and_Spraying

8 Aerobotics, 2024

9 https://www.researchgate.net/publication/385172035_Drones_in_Agriculture_Revolutionizing_Crop_Monitoring_and_Spraying

10 <https://www.technologyreview.com/2016/07/20/158748/six-ways-drones-are-revolutionizing-agriculture/>

11 <https://projects.sare.org/wp-content/uploads/SARE-Final-Report-010922.pdf>

12 <https://www.caa.co.za/industry-information/flight-operations/>



3.3 Digital twins and drones

Digital twin technology is expected to transform agricultural production, however this technology is still in its early stages¹³ and the majority of agriculture applications have yet to emerge past lab-scale implementations, where most have focused primarily on the integration of computational intelligence and remote sensing devices for specific system optimisation and informed management tasks.¹⁴ Current applications have focused largely on crop and land cultivation where resource optimisation and growth forecasting has been the most common application. This is therefore still an emerging opportunity within South Africa, with known applications still at an early phase for water resource management¹⁵ and pasture management on sheep farms.¹⁶ However, as drones will be pivotal in the enabling of this opportunity, it could prove to be a further driver for the uptake of drones.

Drones play a crucial role in creating digital twins for agricultural production by providing real-time, high-resolution data that helps model and simulate farm environments. Digital twins are virtual replicas of physical agricultural fields, crops, and systems, enabling farmers to monitor and optimise production.

Drones equipped with multispectral, thermal, LiDAR, and RGB cameras capture detailed imagery and sensor data to feed into digital twin models. Drones continuously scan and update the digital twin with new data, allowing farmers to track crop growth stages, detect stress early and optimise irrigation and nutrient application. Farmers can test different strategies in the digital twin before applying them in real fields, for example by testing the:

- Impact of different fertilizers
- Effects of weather changes
- Pest outbreak response simulations

Drones can act as the “eyes” of digital twins, continuously providing data to create accurate, real-time, and predictive models of agricultural systems. This can lead to smarter, data-driven farming with increased productivity, sustainability, and profitability. Further investigation of this technology is required in South Africa, along with farmer skills building before this opportunity can be fully realised. However, if there is uptake of this technology in large-scale commercial agriculture it could have a number of impacts on the productivity of farms, and their ability to adapt to climate and other stresses.

13 <https://www.mdpi.com/2079-9292/13/11/2209>

14 <https://www.sciencedirect.com/science/article/pii/S187734352200104X>

15 <https://cgspace.cgiar.org/items/555e5bff-620b-4807-b6a8-93e0cf0978e6>

16 https://thesai.org/Downloads/Volume15No6/Paper_27-Developing_a_Digital_Twin_Model.pdf

4

Discussion

There are a number of strong financial and environmental fundamentals to the adoption of agtech, with the adoption of drones demonstrating how growth in this market can be realised and expanded upon.

The barriers to the uptake of these technologies should therefore be actively addressed by investors and policy makers in the sector, as there are significant opportunities to be realised. Supporting the piloting or demonstrating of new technologies is going to be crucial, and further investigations of an agtech piloting or innovation fund, should be conducted. By unleashing the power of these innovations on the agricultural sector, South Africa could significantly increase agricultural production, improve livelihoods, and increase resilience to climate change.



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