Strategis Partners

AgTech Revolution

The rise of AgTech to solve global food challenges

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Introduction

This paper produced by Strategis Partners profiles the emerging global AgTech industry.

Global, industry and business model trends are discussed in the next chapter, *What's Driving AgTech?*.

Two investment models for AgTech are examined in the following chapter, *AgTech Investment Models*: venture capital and private equity.

The three appendices to this paper are: *A-1. AgTech Venture Capital (VC) Firms*, *A-2. Generalist VC Firms Investing in AgTech*, and *A-3. AgTech Firms*.

What's Driving AgTech?

Drivers of change

Drivers of change stimulating investment in AgTech comprise global drivers of change, industry drivers and business model drivers, as shown in Figure 1. The following paragraphs analyse each of these in turn.

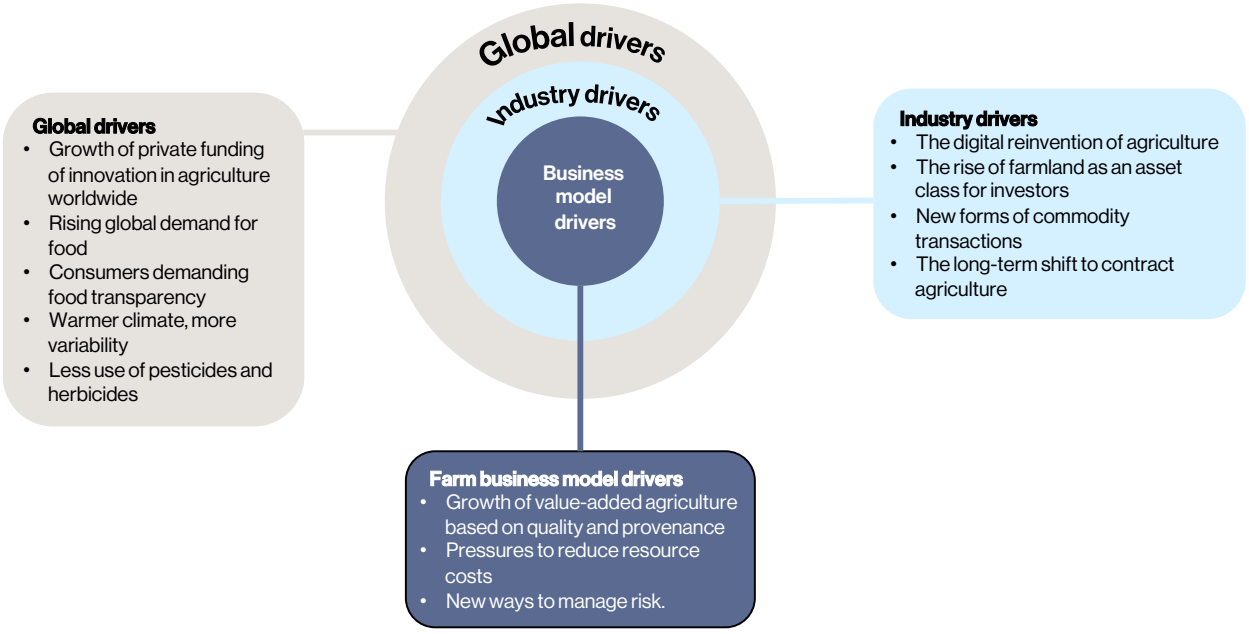

Figure 1: Drivers of change stimulating investment in AgTech.

Global trends driving AgTech

Four global developments are stimulating investment in AgTech:

1. Growth of private funding of innovation in agriculture worldwide
2. Rising demand for food
3. Consumers demanding food transparency
4. Warmer climate, more variability in weather patterns.

Growth of private funding of R&D in agriculture worldwide

Throughout most of the twentieth century, research and innovation in agriculture was mostly funded with public money. Since the early 1980s, however, public expenditures on agriculture R&D have stagnated, even as demand for food and fibre continues to rise. As public funding has ebbed, new flows of capital from the private sector have increased.

Private investors in general are spending more time evaluating agriculture investment for their portfolios. So much so that today there are over fifty global agricultural investment funds, plus a dozen Australian funds. A drmatic increase in corporate vnturing of AgTech is also occurring. This growth in capital inflow to agriculture is expected to continue over the medium- to long-term.

AgTech is an emerging economic sector internationally.[1] Dutia (2014) points out that agriculture venture capital group Cultivian has identified over 900 AgTech startup companies from around the world, including companies in which Cultivian has invested.

[1] See Appendices for a description of AgTech venture capital firms, Generalist VC firms investing in AgTech, and Startup firms in AgTech.

Rising demand for food

World population is expected to increase from 7 billion to 9.2 billion by 2050. Moreover, the rising middle class in China and India continues to fuel growing demand for commodities, while changing diets in Asia are driving demand for higher value food products including meat and dairy products. Sixty per cent more food will need to be produced by 2050.

Increasing urbanisation also places more pressure on arable land and increases reliance on processed foods, and increasingly opaque supply chains for some – food safety and food security.

Consumers demanding food transparency

Consumer trends based on growing affluence in advanced economies and emerging markets such as China, the Middle East North Asia and South East Asia are driving demand demand for higher quality, traceable product.

This is driving agricultural producers and processors to invest in more sophisticated monitoring and information management systems and processes – and combat food fraud.

Warmer climate, more variability in weather patterns

Agriculture is facing potential production yield decreases (or yield growth declines) due to climate change by 2050. At the same time more extreme climate events are becoming more common. Diminishing rainfall, reduced snowpack in key watersheds and extended periods of droughts are also increasing. The recent prolonged drought in California is a case in point.

Industry trends driving AgTech

Four key industry developments are driving investment in AgTech:

1. The digital reinvention of agriculture
2. The rise of farmland as an asset class for investors
3. New forms of commodity transactions
4. The long-term shift to contract agriculture.

The digital reinvention of agriculture

Sensors, intelligent farm machines, ultra-cheap computing, more powerful algorithms, and Big Data have the potential to increase farm returns. Agriculture is advancing as an information economy:

- **The Internet of Things:** Networks of low-cost sensors can monitor crops.
- **Big Data and 'Farms in the Cloud':** Computing services delivered over the Internet, offer the capability to simulate agricultural processes.
- **Advanced robotics and autonomous systems:** More capable robots and drones with enhanced senses, dexterity, and intelligence are being developed and used to automate tasks or augment humans, such as controlling weeds and pests, and planting and harvesting crops.
- **Decision support:** Intelligent software can perform farm-planning tasks, and support decision-making and optimise production processes.
- **Mobile Broadband Internet:** Increasingly inexpensive and capable mobile computing devices with high-speed Internet connectivity to the farmer in the field.
- **Next-generation genomics:** The new genomics marries advances in the science of sequencing and modifying genetic material with the latest big data analytics capabilities – the ability to precisely customise organisms by "writing" DNA.

The rise of farmland as an asset class for investors

Across the world farmland values grew over the past 20 years and farmland remains a top performing asset. [2] Maximising performance in large scale investor-owned farming operations requires new technologies and practices for managing farm enterprises, including real-time communication between farm managers and staff

[2] Interest in farmland as an investment comes from a diverse range of sources. These range from Sovereign Wealth Funds (National governments) who are interested in food security to private high net worth individuals, who are looking to diversify their portfolios into large scale agriculture. Family offices have already seen the opportunities presented by investing in farmland around the world and many have taken substantial positions.

in the central office, and tight control of inventories of farm inputs and output.

New forms of commodity transactions

Historically, agricultural commodity transactions have required a "middleman" between the farmer on the one side, and the trader, the processor or the wholesaler on the other side. An emerging technology, known as *Blockchain*, is a radical innovation that enables direct value exchange over the internet. For agriculture, it has the potential to dramatically reduce transaction 'frictions' of cost, delays, and risk.[3]

Projections on how Blockchain will be used in agriculture can only be speculative at this early stage, but it offers the prospect of:

- Peer-to-peer trading that will disrupt traditional intermediaries; for example in finance, grain and livestock trading
- An explosion in the number and type of agricultural micro-commodity markets
- Ultra-low transaction costs with digital payments for cross-border transactions
- Secure guarantees of provenance of food and fibre, with traceability of goods along the global supply chain
- Sensors in a production network negotiating and deciding with each other via 'smart contracts'.

The long-term shift to contract agriculture

The past two decades has seen tighter vertical integration and contract-based production of commodities. Specialty grains, feeder livestock, fruits and vegetables, are increasingly being produced under contracts, which define tight quality specifications.

Technology for measuring and monitoring production is crucial for the effective implementation of contract farming.

Changes on the farm driving AgTech

Three key farm-level imperatives are driving investment in AgTech:

1. The imperative to grow revenue through value-added agriculture based on quality and provenance
2. Pressures to reduce resource costs
3. New ways to manage risk.

Growth of value-added agriculture

No agricultural product really has to be a commodity, selected only on the basis of lowest price. The key for producers is to know what attributes and supporting services customers want -— and are prepared to pay for.

[3] A blockchain is essentially a record, or ledger, of digital events — one that's "distributed," or shared between many different parties.

Price isn't everything, and technology is providing the means to add value, for example through:

- Improving the consistency of product performance
- Lifting the level of technical support and service
- Improving on-time delivery
- Increasing the frequency of contact between customer and supplier
- Customising the selection of products for the customer end-use.

Pressures to reduce resource costs

Precision and Decision Agriculture has the potential to improve resource efficiency – chemicals, energy, labour, water – in the face of rising input prices.

New ways to manage risk

Taking and managing risk is part of what producers must do to create farm profits. Crop price volatility has been rising, impacted by climate and supply/demand shifts, while climate variability is affecting production yields.

With the latest tools and technologies, producers can develop strategies, which are defensive and focused on avoiding downside risks, together with strategies, which embrace risk and make the most of the opportunities it presents; for example using:

- Data mining to extract patterns from large datasets; for example to help develop production plans to avoid or minimise weather risk.
- Simulation modelling to reproduce in digital form the behaviour of complex production systems, for forecasting and "what if ...?" analysis
- Pest and disease risk monitoring using sensors in the field.

At the same time, new technology innovations to benefit farmers include improved climate forecasting, and new forms of crop insurance that are based on remote sensing and satellite image analysis.

Jan de Leeuw *et al* [4] point out that remotely sensed index insurance for rangelands and livestock are operational, while various applications in crop index insurance are under development. There is much scope for application of remote sensing for index insurance because (1) indices can be constructed that correlate well with what is insured; (2) these indices can be delivered at low cost; and (3) it opens up new markets that are not served by claim-based insurance.

[4] de Leeuw, J., A. Vrieling, A. Shee, C. Atzberger, K. M. Hadgu, C. M. Biradar, H. Keah, and C. Turvey (2014). The potential and uptake of remote sensing in insurance: A review. *Remote Sensing 6*(11), 10888–10912

AgTech Investment Models

Venture capital

Venture capital aims to match talent with capital.[5]

Venture capital money funds startup firms and small businesses with perceived long-term growth potential. This is a very important source of funding for startups since it enables them to cross the "valley of death" – the innovation funding gap that limits the ability of the startup to grow into a mature company. AgTech is now a new frontier for venture capital firms, particularly in North America.[6] The reader is referred to the three appendices to the report:

- Appendix 1 lists the specialist vc firms in Agtech.
- Appendix 2 lists the generalist vc firms in Agtech.
- Appendix 3 lists the firms in AgTech, including startups.

Callahan and Muegge [7] divide the cycle of venture capital investing into five main phases shown in Figure 2:

1. **Deal origination:** Most deals are referred by third parties. Referrals by other vcs are often invitations to join syndicates.
2. **Deal screening:** Most frequently used screening criteria are technology and/or market and stage of financing.
3. **Deal evaluation:** Decision to invest based upon expected return compared with level of risk. Factors considered include market attractiveness, product differentiation, management team capabilities, and protection of business from uncontrollable factors, e.g. competition, product obsolescence.
4. **Deal structuring:** vc funds use a wide range of approaches, with a key aim of motivating managers to perform. The deal price is determined by quality of opportunity and past experience with similar deals.
5. **Post-investment activities:** Representatives of venture funds normally sit on boards of operating businesses. They assist with business strategy and act as 'sounding boards' for operating business management.

[5] Venture capital's emergence in the United States in the latter half of the twentieth century helped produce entrepreneurial organisations that played a crucial role in semiconductors, software, computers, and communications (Pisano, 2006a).

[6] Companies in AgTech, Ag BioTech and FoodTech raised a record $2 billion in first half of 2015. Companies in the sector have been backed by 280 investors in the first six months of this year, surpassing the total for 2014. Source: <www.agriinvestor.com>

[7] Callahan, J. and S. Muegge (2003). Venture capital's role in innovation: issues, research and stakeholder interests. *The international handbook on innovation*, 641–663

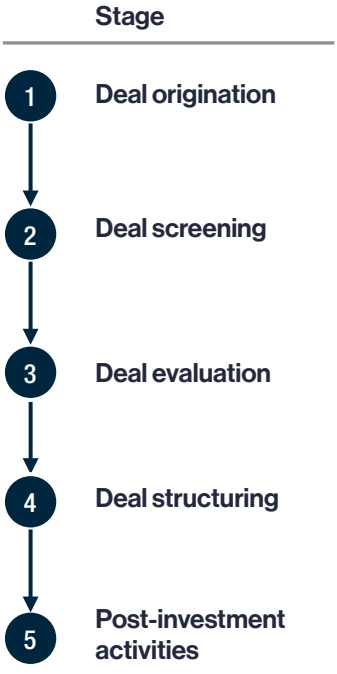

Figure 2: The venture capital process.

Case Study: Blue Sky Venture Capital Blue Sky's Venture Capital fund[8] specialises in providing both late stage venture capital and early expansion capital to Australian companies to help support their growth. Blue Sky Venture Capital currently has investments in companies across a broad range of industries, including e-commerce, consumer technology, medical devices and specialty pharmaceuticals.

[8] Blue Sky will invest in opportunities which meet most of the following characteristics:

- Be rapidly growing Australian-based businesses in the 'late startup/early expansion' stage of development;
- Have management teams with proven track records;
- Have a competitive advantage that gives it the potential to become nationally and/or globally competitive in its sector;
- Provide Blue Sky Venture Capital with a meaningful equity stake with board representation and appropriate shareholder protections;
- Have an enterprise value of less than $50 million;
- Be seeking between $0.5 million – $5 million in funding; and
- An investment horizon of less than 4 years.

Website:
<http://bit.ly/1QVzCjQ>

Ownership and control in VC firms

Ownership and control in VC firms can be summarised as follows:

- Venture capital contracts separately allocate cash-flow rights, voting rights, board rights, liquidation rights and other control rights.[9]
- Venture capitalists use various securities to fine-tune these rights. Convertible preferred stock is most frequently used.
- Cash-flow rights, voting rights, control rights and future financing are often contingent on observable measures of financial and non-financial performance.
- If the firm performs poorly the venture capitalists obtain full control. If the firm's performance improves, the entrepreneur retains/obtains more control rights.
- Venture capital contracts usually include non-compete and vesting provisions in order to make it more expensive for the entrepreneur to leave the firm.
- In general, venture capitalists have more control in later rounds of financing.

[9] Takizawa, H. (2003). New institutional arrangements for product innovation in silicon valley. *Ownership and Governance of Enterprises*, 69

Assessing the Venture Capital model

In many ways, venture capital is the perfect funding mechanisms for a young R&D intensive start-up. Venture capitalists have expertise that the typical investor lacks and bring a governance structure to the venture, as discussed in the previous chapter. Its time horizon and funding model is appropriate for businesses that can reach a suitable 'liquidity event' (such as an IPO or sale of the business to another company) in about three years.

In Australia however, VC investments in ag-science and technology have been few and far between.[10]

[10] Two Australian VC investments of note have been Catapult Genetics (DNA testing of livestock), and Echoview Software (measurement and tracking of fish stocks). Catapult Genetics was established in 2006 and sold to Pfizer Animal Health in 2008.

Attracting funding under a Venture Capital model

Given the riskiness of a venture capital portfolio, venture capitalists want to be able to spread their portfolio across a broad patch of companies. This means limiting investments in any one company (e.g. typically no more than $20 million). However some science based businesses take a decade or more of R&D and potentially tens of millions of dollars of investment to generate a product. Venture capital is not designed to fund such a venture.

Tax incentives for venture capital. Innovation Australia[11] provides financial support for early stage innovation via the Early Stage Venture Capital Limited Partnerships (ESVCLP) and the Venture Capital Limited Partnerships (VCLP) programmes. Both were developed to stimulate Australia's venture capital sector with favourable tax treatment for investors, both foreign and domestic.

[11] Innovation Australia (the Board), is an independent statutory body established under the IR&D Act to assist with the administration and oversight of the Australian Government's industry innovation and venture capital programs delivered by AusIndustry.
Website: <http://bit.ly/1GuiL70>

Case Study: Yozma – a venture capital fund of funds. In 1993 the Israeli government created Yozma[12], a $100 million fund of funds that in three years spawned 10 venture capital funds. In each one, Yozma, an Israeli private partner, and a foreign private partner with proven fund management expertise all invested approximately equal amounts[13].

[12] In Hebrew, Yozma means "initiative."

[13] Isenberg, D. J. (2010). How to start an entrepreneurial revolution. *Harvard Business Review 88*(6), 40–50

The Yozma program initially offered an almost two-thirds-to-one match. If the Israeli partners could raise $12 million to invest in new Israeli technologies, the government would give the fund $8 million. Next, the government raised the bar. It required VC firms to raise $16 million in order to get the government's $8 million.

According to Señor and Singer[14], the allure for foreign VCs, however, was the potential upside built into this program. The government would retain a 40 per cent equity stake in the new fund but would offer the partners the option to cheaply buy out that equity stake-plus annual interest-after five years, if the fund was successful. This meant that while the government shared the risk, it offered investors all of the reward. That option was exercised by eight of the ten funds, profitably for the government. Five years after the founding of Yozma, its remaining assets were liquidated by auction, since it had served its initial purpose. Señor and Singer argue that this is one of the reasons that the Israeli venture capital industry not only became self-sustaining but simultaneously achieved a quantum leap in growth.

[14] Senor, D. and S. Singer (2011). *Start-up nation: The story of Israel's economic miracle*. Random House LLC

Managing risk under a Venture Capital model

Key risk drivers in VC investments are to do with the the uncertainty of the technology's prospects and the information asymmetry between investors and the entrepreneur. To deal with such issues, venture capital brings a governance structure to the deal, not just funding. Venture capitalists typically sit on boards. They monitor their investments closely and exercise reasonably close oversight and control. This is critical for an R&D venture because the high level of uncertainty needs an adaptive approach to governance.

The essential risk management tool is the design of the venture financing contract. Kaplan and Stromberg[15] observe that many venture capital contracts condition control rights on contingencies such as the attainment of performance milestones. Venture capitalists are often given preemptive rights to participate in future rounds of financing (for example, to maintain their pro rata share of the equity in their start-up venture).

[15] Kaplan, S. N. and P. Strömberg (2003). Financial contracting theory meets the real world: An empirical analysis of venture capital contracts. *Review of Economic Studies*, 281–315

Private equity

Private Equity (PE) is that which is not quoted on a public exchange. It consists of investors and funds that make investments directly into private companies or conduct buyouts of public companies that result in a delisting of public equity.[16] Capital for private equity is raised from retail and institutional investors, and can be used to fund new technologies, expand working capital within an owned company, make acquisitions, or to strengthen a balance sheet.

Once investors have placed their money, it remains "locked" for an agreed period of time, until the fund manager and its partners "exit" from the companies in their portfolio. Common exit strategies include selling the company assets or planning for a public offering.

[16] Source: Investopedia <bit.ly/1PB7Coo>

Case Study: Blue Sky Private Equity

Blue Sky's Private Equity fund[17] currently has investments in companies across a broad range of industries, including retail, consumer goods, equipment hire, manufacturing, media and mining services. It employs a range of investment strategies, all of which share three common characteristics:

[17] Website: <http://bit.ly/1PIoEwB>

- Investing in private companies allows Blue Sky Private Equity to take a medium-term view on business performance. Investee companies are not subject to continuous disclosure or half-year reporting requirements, so Blue Sky can make decisions that are in the long-term interests of the company.
- Blue Sky Private Equity takes meaningful equity stakes in the companies in which they invest as well as playing a key support role as a partner helping with the strategy and operations of the business, and taking board seats to assist with the company's performance. It acquires significant but non-controlling stakes in the businesses in which it invests (typically 30-50 per cent).
- The fund invests with a medium-term exit horizon, planning to grow and develop the business for three to five years before selling the business, together with the founder/owner, at a profit.

Assessing the Private Equity model

Couto, Divakaran and Caglar [18] identify seven ways in which private equity firms create value:

1. **Focus on value creation.** Beyond simple financial engineering and severe cost cutting, PE deals feature substantive operational improvements that result from the application of deep industry and functional expertise.
2. **Focus on cash flow.**[19] To improve cash flow, PE firms tightly manage their receivables and payables, reduce their inventories, and scrutinise discretionary expenses.
3. **Operate as through time is money.** There is a bias towards rapid decision-making and taking action.
4. **Apply a long-term lens.** Private equity firms typically have three to five years to invest their fund, providing time to carefully assess potential targets and develop an investment thesis – and a window of about five to ten years exit their deals and return the proceeds to investors.
5. **Assemble the right team.** Effective leadership is critical to the success of their investment – in fact, they sometimes invest in a company based on the strength of its management talent.
6. **Link pay and performance.** PE firms pay modest base salaries to their portfolio company managers, but add in highly variable and annual bonuses based on company and individual performance, plus a long-term incentive compensation package tied to the returns realised upon exit.
7. **Select stretch goals.** PE general partners quickly assess what matters in driving the success of an acquired company and then isolate these few measures and track them. They set clear, aggressive targets in a few critical areas and tie management compensation directly to those targets.

[18] Couto, Vinay, D. A. and D. Caglar (2012). Seven value creation lessons from private equity - what top-tier pe firms can teach public companies about creating and sustaining value over time. *Strategy + Business Magazine*

[19] PE firms watch cash more closely than earnings as a true barometer of financial performance and prefer to calculate return on invested capital rather than fuzzier measures such as return on capital employed.

Attracting funding under a Private Equity model

Private equity capital can fill the gap between venture capital and public equity, such as funding capacity expansion and/or entry into new markets.

Case Study: Sundrop Farms, Port Augusta SA. Sundrop Farms[20] is an example of where private equity is financing the development of an innovative horticultural enterprise in South Australia.

The private equity partner in Sundrop Farms is KKR, a leading global investment firm that manages investments across multiple asset classes including private equity, energy, infrastructure, real estate, credit and hedge funds. KKR works with its private equity portfolio partners on issues related to environmental, social, and governance (ESG) management. The firm believes that by including ESG considerations in its private equity investment decisions, it is a smarter, more conscientious investor.

[20] Website: <www.sundropfarms.com>
Saumweber Holdings, which owns the Sundrop technology, is a family office and investment holding company, based in London.

The KKR deal would not have been possible without the support of the Clean Energy Finance Corporation.[21] CEFC underwrote a debt package for the project which helped Sundrop Farms secure further borrowings with major Australian commercial lenders. Upon this foundation, KKR provided $100 million of private equity funding so that Sundrop could proceed with plans to expand its Port Augusta prototype into a 20-hectare facility.

[21] CEFC is a statutory agency with a mission to deploy $10 billion of capital investment in renewable energy, low-emission technology and energy efficiency in Australia. It operates under the Clean Energy Finance Corporation Act 2012, guided by three principles: focus on the Australian clean energy sector; apply a commercial approach to achieve a positive financial return; and address financial barriers to clean energy.
Website: <www.cleanenergyfinancecorp.com.au>

Managing risk under a Private Equity model

Managing risk under the private equity model are similar to venture capital; that is private equity is not just a source of funding, but also a governance structure. PE capitalists typically sit on boards. They monitor their investments closely and exercise reasonably close oversight and control. In addition, exercising proper oversight requires a deep understanding of the working of the company, its projects, and its management. This kind of information is simply not available to the typical hands-off investor.

Appendices

1. AgTech venture capital firms
2. Generalist vc firms investing in AgTech
3. Startup firms in AgTech

A-1. AgTech Venture Capital (VC) Firms

Avrio Capital

Avrio Capital[22] invests in innovative food and agriculture companies that provide solutions to global challenges in the areas of health, wellness and sustainability. Avrio is a hands-on investor who works alongside of its portfolio companies to provide the support and resources needed to transform emerging companies into successful globally competitive enterprises. Based in Canada, the Avrio team has deep roots in both food and agriculture. Since 2002 the team has invested in more than 40 companies with operations ranging from crop inputs and food production through to value added processes such as fermentation and synthetic biology. The team's breadth and depth of experience in operational, transactional and sectorial issues allows them to maximize each portfolio company's opportunity for success.

[22] Website: www.avriocapital.com

Cultivian Sandbox

Cultivian Sandbox Ventures[23] invests in early-stage, technology-focused agribusiness companies who are commercializing the necessary solutions. As early investors and active board members, Cultivian employs a hands-on approach to building companies and are often directly involved in setting company strategy, recruiting key executives, and raising additional capital. Much more than simply a financial resource, Cultivian aims to deliver value though active collaboration with strategic partners and its network in the agriculture and food industries.

[23] Website: cultiviansbx.com

Finistere Ventures

Finistere Ventures[24] invest in private companies across the agricultural and food value chains, including in Australia and New Zealand. It focuses on three investment areas:

- Life Science: molecular biology traits & seeds, biopesticides and animal health
- IT: precision agriculture, water management, inventory management and trading platforms
- Sustainability: biomass, enzymes and ag-chemicals.

[24] Website: finistere.com

First Green Partners

First Green Partners[25] is an early-stage investment firm focused on building companies that leverage advances in science and technology applied to agriculture. First Green Partners pursues opportunities in crop breeding and growth technologies, environmentally sustainable agri-chemicals and fertilizers (especially microbial applications), novel process technologies, and the agriculture data chain.

[25] Website: firstgreenpartners.com

Pangaea

Pangaea[26] invests in start-up companies that use advanced materials to make our world better. Breakthroughs in advanced materials are becoming increasingly important for companies to excel in almost any market. Advanced materials are solving fundamental problems necessary to make products more efficient, sustainable, less expensive, and better performing, key attributes necessary for widespread adoption of any product. Pangaea's current fund is focused on advanced materials within energy, electronics, health, and sustainability.

[26] Website: www.pangaeaventures.com

Royal DSM

Royal DSM[27] is a global science-based company active in health, nutrition and materials. By connecting its unique competences in Life Sciences and Materials Sciences DSM is driving economic prosperity, environmental progress and social advances to create sustainable value for all stakeholders simultaneously. DSM delivers innovative solutions that nourish, protect and improve performance in global markets such as food and dietary supplements, personal care, feed, medical devices, automotive, paints, electrical and electronics, life protection, alternative energy and bio-based materials. DSM and its associated companies deliver annual net sales of about €10 billion with approximately 25,000 employees. The company is listed on Euronext Amsterdam.

[27] Website: www.dsm.com

ScoutPro

ScoutPro[28] is a provider of agricultural apps that are designed to save you time, while making your business more profitable. With the progress of smartphone and tablet devices, the company's inaugural product, the Scout Pro 1.0 app, was developed.

[28] Website: www.scoutpro.org

Semios

Semios[29] is an emerging leader in the development of machine-to-machine technology for agriculture. The technology enables growers of high-value crops to monitor for insect pests, plant diseases and micro-climates and determine where and when to best take action

[29] Website: semios.com

to protect and increase crop value, based on precision agriculture, biological pest control and data management.

Syngenta Ventures

As the venture capital arm of Syngenta, one of the world's leading agribusiness companies, Syngenta Ventures[30] seeks to identify early stage companies with a strong technology base or new business model. The goal is to build valuable businesses benefitting both Syngenta and the investee company stakeholders.

[30] Website: bit.ly/1RanriW

Verdex Capital

Verdex Capital[31] is a venture capital group focused on AgTech investments. It was established by AVAC Ltd., an investment company with over 16 years of experience in financing early-stage innovative business opportunities and providing both capital and other value-added services to grow commercial business successes. With deep experience in agriculture and venture capital, Verdex Capital has the partnerships, networks, and expertise to identify true game-changers.

[31] Website: www.verdexcapital.com/

Y-Combinator

Y Combinator[32] provides seed funding for startups. Seed funding is the earliest stage of venture funding. It pays your expenses while you're getting started. Some companies may need no more than seed funding. Others will go through several rounds. There is no right answer; how much funding you need depends on the kind of company you start. Y Combinator's goal is to get the startup through the first phase. This usually means getting to the point where the startup has built something impressive enough to raise money on a larger scale. Then Y Combinator introduces the startup to later stage investors—or occasionally even acquirers.

[32] Website: www.ycombinator.com

A-2. Generalist VC Firms Investing in AgTech

Andressen Horowitz

Andreessen Horowitz[33] is a $4 billion venture capital firm, founded in 2009 by Marc Andreessen and Ben Horowitz. The company is headquartered in Menlo Park, California. Their AgTech investee companies include Airware (drone software, hardware and cloud services) and Granular (farming software).

[33] Website: a16z.com

Khosla Ventures

Khosla Ventures[34] is a venture capital firm focused on early stage companies in the Internet, computing, mobile, silicon technology and clean technology sectors. Their AgTech investee companies include BioConsortia (microbial consortia for increasing agricultural yields), Granular (farming software) and LanzaTech (a waste-gas-to-fuel startup).

[34] Website: www.khoslaventures.com

Kleiner Perkins Caufield & Byers

Kleiner Perkins Caufield & Byers[35] is a venture capital firm with over 40 years of experience helping entrepreneurs.

[35] Website: www.kpcb.com

Sequoia Capital

Sequoia Capital[36] is a venture capital firm specialising in incubation, seed stage, start-up stage, early stage, and growth stage investments in private companies.

[36] Website: www.sequoiacap.com

A-3. AgTech Firms

Advanced Animal Diagnostics

Advanced Animal Diagnostics (AAD)[37] provides livestock producers with diagnostic products that improve profitability and empower more precise care of animals so they live healthier, more productive lives. ADD are committed to researching, developing and commercializing the industry's most reliable, on-farm diagnostic tests, such as QScout MLD for early detection of subclinical mastitis in dairy cows.

[37] Website: www.aadiagnostics.com

Airware

Airware's [38] operating system enables businesses to safely operate drones, manage a variety of aircraft, and integrate aerial data into design, engineering, asset management, and decision workflows. Airfare is transforming business practices by unmanned aerial vehicles (UAVs) enabling companies to rapidly and repeatably collect aerial data more easily than traditional methods. This helps businesses meet regulatory requirements, make better decisions, and keep workers safe.

[38] Website: www.airware.com

Bioconsortia

BioConsortia Inc. [39] is devoted to developing solutions through enhanced crop productivity. Confronted with the global issues of rapid population growth, continued malnutrition, climate volatility, and dwindling exploitable resources, their scientists and business professionals thrive on partnerships and collaborations with like-minded people who are aware that microbial products and who play a major role in future mainstream agricultural crops. BioConsortia thrives to be the best at finding effective answers to sustainable production of more food, feed, fiber, and fuel from our land.

[39] Website: www.bioconsortia.com

Conservis

Conservis [40] provides farm management software to help you see your operation from the dirt up. Track field activities, manage inventories and analyze yields. The Conservis platform connects your

[40] Website: www.conserviscorp.com

information to manage your progress today and harvest opportunities ahead. For 6 years running, farmers using Conservis have had the power to be more efficient, more competitive and more productive season after season.

Farmers Edge

Farmers Edge [41] help close the gap between agriculture and technology ensuring relevant information becomes a useful tool. Their focus on using innovative agricultural practices to make crop production more profitable, sustainable and maintain a reliable food supply by bringing to use innovative agricultural tools and technologies.

[41] Website: www.farmersedge.ca

Granular

Granular [42] is a software product for the farm. Its aim is to help make running a large farm easier and more efficient, and to help measure, analyse and improve the entire operation.

[42] Website: www.granular.ag

LanzaTech

LanzaTech's [43] novel gas-to-liquid technology has opened up new sources for making low-carbon chemicals and fuels that displace petroleum without the environmental concerns associated with crop- and land-based bioproducts. LanzaTech's bioprocessing platform offers an economically robust route to carbon capture and re-use enabling the monetization of local gas sources with minimal capital investment, giving off-grid communities access to clean, cost competitive and reliable energy.

[43] Website: www.lanzatech.com

Rubicon

Rubicon Water [44] is a privately held company headquartered in Melbourne but now with offices in Colorado and California. Established in 1995, Rubicon's vision is to improve the productivity of the world's farmers in an environmentally sustainable way. Rubicon delivers advanced technology to managers of gravity fed irrigation networks that enables them to operate and manage their water resources to unprecedented levels of efficiency and control.

Rubicon has designed, built and installed over 15,000 control and measurement devices in TCC and FarmConnect® systems sold to more than 50 customers in 10 countries.

[44] Website: www.rubiconwater.com

Semios

The Semios [45] platform allows the farmer to view and control their ranch in real-time. It comprises of:

- a dedicated network of sensors - connect frost, leaf-wetness, soil moisture and pest pressure sensors customized to your orchard

[45] Website: www.semios.com

- single site drive models - use in-field data to drive acre specific models for fire blight, cherry mildew or even codling moth and
- view your ranch from 1000ft - see events as they unfold; or, go back in time to understand what happened

Terramera

Terramera's [46] technology platform develops plant-based biopesticides that are cheaper and more effective that conventional chemical pesticides. Their technology has applications for agriculture, professional pest control and consumer pest control.

[46] Website: www.terramera.com

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Strategis Partners

About the Author

Jay Horton, Founder and Managing Director of Strategis Partners, is a leading adviser to Companies and Governments in Asia and Australia on strategic management issues, including scenario planning, capital investment decision making and real options analysis, and corporate strategy.

During his twenty five year management consulting career, he has worked with clients in Australia, Canada, China, Japan, Hong Kong, New Zealand and South East Asia.

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