



The AgTech revolution

**How new developments in technology
are changing the farming game**



The potential of leveraging technology to advance farming practices

Farming is changing. Digital technology is creating opportunities to transform the food and agribusiness industries and alleviate the many pressures on our food system. As Canada's farming industry faces increasing labour shortages, stiff competition from foreign players, rising land costs, and shifting weather patterns, its future will depend on its willingness to embrace technology to find efficiencies, streamline production, increase traceability, reduce costs — and ultimately build a more sustainable, resilient system.

Many farmers, particularly smaller ones, are understandably reluctant, looking at the large upfront investments that are generally associated with technological advancement. To help with funding, there's an opportunity for our government to step in and offer grants and rebates to kickstart innovation, as well as for investors to get into this promising new market. Farmers themselves should also look to start with investments that have a quick return, which will help fund additional investments.



The case for transforming agriculture into a high-tech industry

Why should agriculture — a very hands-on, traditional, human-centred industry — go high-tech? The list of reasons is long. Research and innovation in agri-food are key enablers of economic growth. Our world is changing in ways that our grandparents could never have imagined, including:



Growing population: By 2050, the world's population is expected to reach almost 10 billion (up from 7.7 billion today), increasing our global need for food while the amount of available farm land remains the same.¹



Urbanization: More than 50 percent of the world's population lives in urban areas, and they rely on the farming industry to provide for them.²



Societal changes: The demand for resource-intensive food products, such as animal-based products, continues to increase.



Climate change: Changing weather conditions around the globe are affecting the quality of our soil and our crop yields.



Labour shortages: Transitioning family farms to new generations is not always simple, and the COVID-19 pandemic made it difficult to rely on temporary foreign workers, creating labour challenges from multiple angles.



Globalized trade: International trade agreements allow for crops to be grown in the most suitable locations and then exported, bringing increased competition to Canada's farms.



International regulations: Exporting globally can also lead to regulatory entanglements between countries, making importing/exporting a challenge.



Integrated value chains: Large companies are integrating vertically to optimize their value chains, bringing even more competition to the smaller operation.

With all of the opportunities technology brings to fight against climate change, improve nutritional security, and enhance sustainability, there is no question that it's the way of the future for farming. And entrepreneurs are catching on quick.

¹Growing at a slower pace, world population is expected to reach 9.7 billion in 2050 and could peak at nearly 11 billion around 2100," United Nations Department of Economic and Social Affairs, June 17, 2019, <https://www.un.org/development/desa/en/news/population/world-population-prospects-2019.html>.

²<https://www.who.int/data/gho/data/themes/theme-details/GHO/urban-health>



The expanding field of AgTech

The field of agricultural technology, or AgTech, is growing exponentially, and by 2025 it's expected to be a US \$729.5-billion industry.³ At its core, it is about reinventing how farms are operated, bringing together software, process transformation, and analytics to enable tremendous breakthroughs in a value chain that is primarily commodity driven.

Agriculture technologies can link farming devices to the Internet of Things (IoT), allowing farmers to manage their farms digitally from a central point. AgTech also includes precision farming, which uses GPS, drones and other technologies to enable more accurate farming decisions, such as where to water and when to harvest. Genomics and genetic modification are also part of this list, helping to improve varieties and extend yields, as is the use of blockchain technology, such as KPMG Origins, to automate data collection and sharing across the global supply chain, and improve trust and traceability. The opportunities are endless and the list of technology innovations in the sector is growing every day.

³Global Food & Agriculture Technology and Products Market by Industry (Animal, Agriculture, Cold Chain, Food & Beverage, and Cannabis) and by Regional Analysis (North America, Europe, Asia Pacific, Latin America, and Middle East & Africa)," Market Data Forecast, February 2020, <https://www.marketdataforecast.com/market-reports/food-agriculture-technology-and-products-market>

Disruptive AgTech innovations

- Artificial Intelligence and Machine Learning to analyze data and optimize temperature, nutrients and other inputs
- Big data
- Blockchain
- Controllable LED lighting systems
- Crop production advancement using soil science
- Farm automation
- Farm robotics
- Indoor vertical farming
- Livestock farming technology
- Modern greenhouses
- Precision agriculture
- Remote sensing
- Robotics and automation used during seeding, input distribution, harvesting
- Smart irrigation

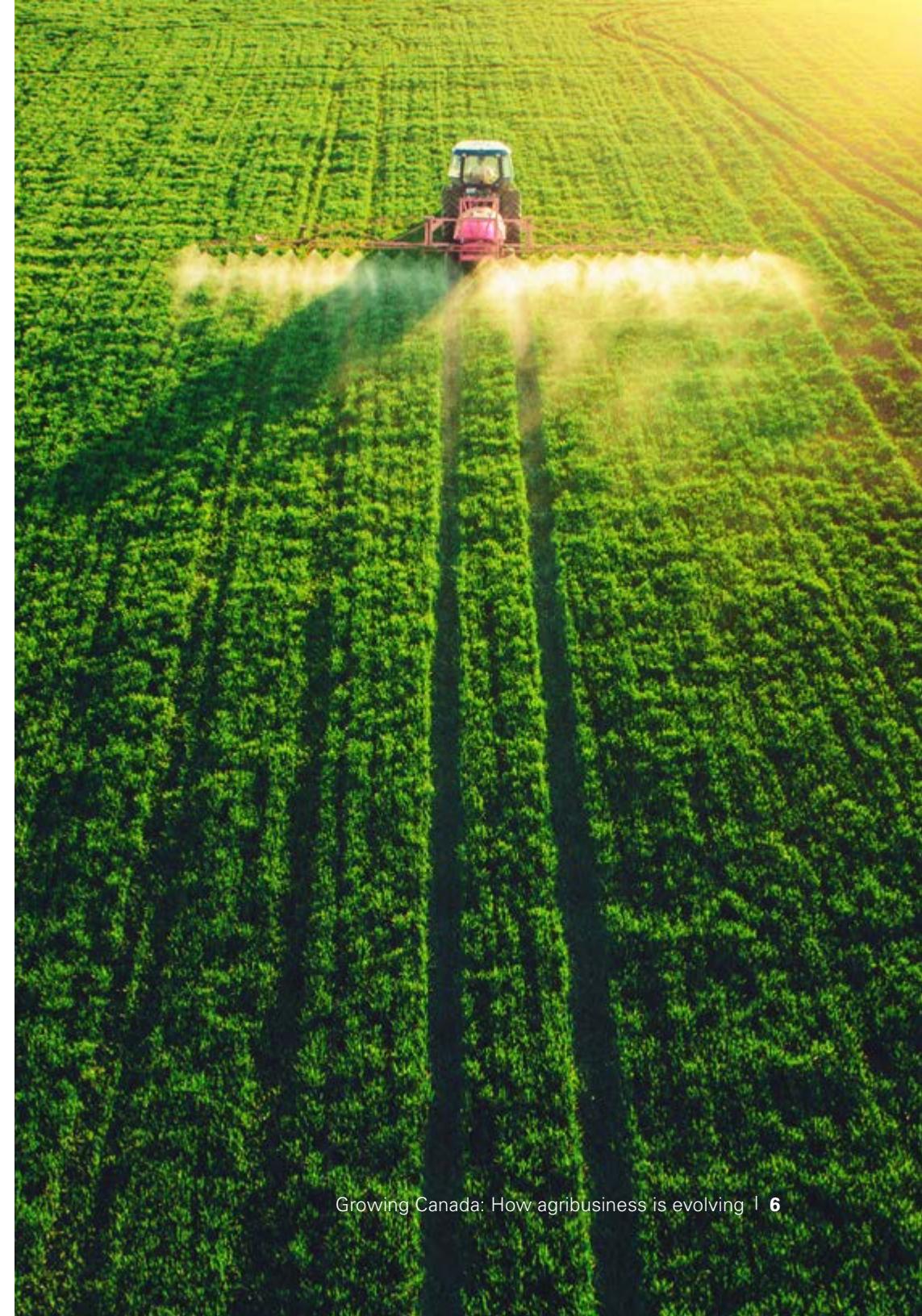


One of the key ingredients to the successful use of technology is data collection, something that is quite new to many farms. Often that's where technology application starts: implementing methods for collecting data, both as inputs to other technological solutions and as an ongoing way to quantify benefits and return on investment.

How AgTech innovators are capturing value

Since about 2015, global venture funding for AgTech has exploded. According to Crunchbase data, venture capitalists invested \$4 billion in AgTech startups in each of the last two years.⁴ Investors are looking for sustainable investment strategies, with companies that are building simple, customer-centric solutions that make farmers' lives easier.

In its efforts to grow the output of the sector, Canada has a semi-privatized and semi-federalized approach. Private investors and governments both play a role in funding research and development, applied research and commercialization efforts. With federal programs like the Canadian Agricultural Partnership (a five-year, \$3 billion federal investment program), Canada is looking to stimulate agricultural innovations such as new crop varieties, livestock breeds, nutrient management practices, tilling methods and farm machinery, as well as advancements in biotechnology, precision agriculture, communication and information technologies.



⁴Christine Hall, "Agtech Sector Blooms As More Dollars and Startups Rush In," Crunchbase News, August 20, 2020, <https://news.crunchbase.com/news/agtech-sector-blooms-as-more-dollars-and-startups-rush-in/>.

Canada itself has at least 166 startups that are focused on AgTech.⁵ Yet while the Canadian government's stated goal is to prompt growth and innovation in the sector, some may still be curious about whether its efforts will really be enough to help us compete globally. Especially when compared to countries like Israel, which has a significant lead when it comes Agri-food tech startups. The country's civilian R&D budget is more than any other European country, plus its government invests in both venture-capital funds and in startups, in addition to connecting startups to farmers directly to pilot technologies before they're exported.⁶



According to the program website, "the **Canadian Agricultural Partnership** is a \$3 billion, five-year (2018-2023), investment by federal, provincial and territorial (FPT) governments to strengthen and grow Canada's agriculture and agri-food sector with:

- Simplified and streamlined programs and services that are easier to access
- Improvements to programs that help manage significant risks that threaten the viability of your farm and are beyond your capacity to manage
- \$2 billion in FPT (federal, provincial, and territorial government) cost-shared strategic initiatives
- \$1 billion for federal activities and programs"⁷

⁵Remi Schmaltz, "Canada AgriFood Tech Market Map: 166 Startups Growing Canada's Agricultural Sector," AgFunderNews, May 2, 2019, <https://agfundernews.com/canada-agrifood-tech-market-map-166-startups-grow-canadas-agricultural-sector.html>.

⁶Why Agtech is Blooming in Israel," Agritecture (content sourced from The Economist), January 30, 2019, <https://www.agritecture.com/blog/2019/1/19/why-agtech-is-blooming-in-israel>.

⁷Canadian Agricultural Partnership, Government of Canada, last modified January 27, 2021, <https://www.agr.gc.ca/eng/about-our-department/key-departmental-initiatives/canadian-agricultural-partnership/>.

Canadian AgTech challenges to overcome

To secure Canada's place as a leader in this space, the government and the industry need to collaborate in addressing a number of challenges. For instance, a common analytics platform, as well as improved rural broadband connectivity, would allow farmers and producers to collaborate on research and development (R&D) on a large scale, which could bring great advancements. Canadian universities are renowned for their agri-food research, and efforts to commercialize it should be increased. We also hope to see more opportunities for funding. The public sector continues to be the largest source of funding for Canada's agriculture R&D, but there is also a large opportunity for private investments to serve this sector.

The innovation ecosystem in the agri-food sector has a ways to go before reaching its peak maturity. Innovation incubators and accelerators have proven very successful in other industries, as have mentorship programs, and these concepts should be further developed in AgTech. This will help entrepreneurs access capital for growth, pilot new ideas, and commercialize novel technology.

Many Canadian farmers still rely on their own experience and experimentation rather than third-party advice to implement a new technology or process. But we urge them to take steps, even small ones, toward this new way of farming. Consider developing or hiring people with technology comfort and expertise to help, including "enablers" (individuals who possess the skillsets to assist with the adoption of new technology

and productivity enhancing practices) and "specialists" (knowledge-based workers capable of improving processes, productivity and well-being).

When all of these stakeholders do their part to advance the use of technology in our farming industry, we will truly benefit from the possibilities it offers.

Whether you're a farm wanting to embark or expand on a technology journey, an AgTech company looking to grow or sell, or a keen-eyed investor who sees the potential in this sector, KPMG's agribusiness team can help. We work with farms to help them digitize their operations, find efficiencies, and remain competitive. For more information on how our agribusiness practice can help you, please contact our KPMG in Canada professionals today.

Feed the nation, feed the world. **Let's do this.**



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